OPTREX

DOT MATRIX LCD MODULE

Character Type DMC Series

DMC Series

OPTREX's Dot Matrix Liquid Crystal Display Module DMC Series can easily be connected to a micro computer by using LSI s which contain sophisticated control circuits, character generators, etc.
DMC Series is most suitable for use with micro computer peripheral, word processor, POS terminal and telecommunication systems etc.

〈Features〉

(1) 8-bit or 4-bit MPU interface is available.
(2) 160 JIS type characters such as Alphabet, Numeral and Kana and 32 special characters and symbols can be displayed by internal character generator (ROM).
(3) Random symbols can be displayed by character generator (RAM).
(4) Many instructional functions by means of program such as "clear display", "home cursor", "on/off cursor", "blink character", "shift display", "shift cursor", "read/write display date", etc. are available.
(5) Compact and light weight design enable easy assembly on device.
(6) Single "+5V" power supply (Standard Type)
(7) Low power consumption

APPLICATIONS

- Personal Computer
- Electronic Typewriter
- Word Processor
- Facsimile
- Plain Paper Copier
- Telecommunication Systems
- Instrument Devices
- POS Terminal
- Other Peripherals

DMF Series

〈Features〉

With a liquid crystal display of an excellent characteristics and reliability, OPTREX has developed the "DMF Series" for large scale graphic display. These are exceptional in the following good points,

(1) Low voltage operation, Low power consumption.
(2) Small-sized, Light, Thin.
(3) Figure display, and Character as well.
(4) High contrast, Wide viewing area.
(5) Large scale display as CRT.

The above 5 points are a part of presentation.
As an ideal usage, OPTREX "DMF Series" are winning good reputation on equipments of Personal computer, Word processor, Sequence controller, Process controller, Oscilloscope and other peripheral equipment.

DMC Series

Type No.	Display Format	Display Fonts	Module Size (W×H×Tmm)	View Area (W×Hmm)	Character Size (W×Hmm)
DMC16106A	16 characters×1 line	5×11 dots	80×36×10	64.5×13	3.2×8.2
DMC16106C	16 characters×1 line	5×8 dots	80×36×10	64.5×13	3.2×5.95
DMC16117A	16 characters×1 line	5×8 dots	80×36×10	64.5×13	3.2×5.95
DMC16128	16 characters×1 line	5×7 dots+Cursor	122×33×11	99×13	4.84×9.66
DMC16129	16 characters×1 line	5×7 dots+Cursor	122×33×11	99×13	4.84×9.66
DMC16207	16 characters×2 lines	5×8 dots	84×44×11	61×16	2.95×5.55
DMC16230	16 characters×2 lines	5×7 dots+Cursor	122×44×11	99×24	4.84×9.66
DMC16249	16 characters×2 lines	5×8 dots	80×36×11	64.5×13.8	2.95×4.35
DMC16433	16 characters×4 lines	5×8 dots	87×60×11	61.8×25.2	2.95×4.75
DMC20171	20 characters×1 line	5×7 dots+Cursor	182×33.5×13	83×18.6	3.2×5.55
DMC20215	20 characters×2 lines	5×8 dots	116×44×11	83×18.6	3.2×5.55
DMC20261	20 characters×2 line	5×8 dots	116×37×11	83×18.6	3.2×5.55
DMC20434	20 characters×4 lines	5×8 dots	98.0×60×11	76×25.2	2.95×4.75
DMC24138	24 characters×1 line	5×11 dots	118×36×11	93.5×15.8	3.2×8.2
DMC24227	24 characters×2 lines	5×8 dots	118×36×11	93.5×15.8	3.2×5.55
DMC32132	32 characters×1 line	5×11 dots	174.5×31×11	123.5×16.5	3.2×8.2
DMC32239	32 characters×2 lines	5×8 dots	174.5×31×11	141.0×16.5	3.45×5.55
DMC32216	32 characters×2 lines	5×8 dots	175×44×11	130×18.6	3.2×5.55
DMC40131	40 characters×1 line	5×11 dots	182×33.5×11	152.5×16.5	3.2×8.2
DMC40218	40 characters×2 lines	5×8 dots	182×33.5×11	152.5×16.5	3.2×5.55
DMC40457	40 characters×4 lines	5×8 dots	190×54×10	147×29.5	2.78×4.89
DMC16187-YGR	16 characters×1 line	5×8 dots	80×36×15	64.5×13	3.2×5.95
DMC16266-YGR	16 characters×2 line	5×8 dots	84×45×15.1	61×16	2.95×5.55
DMC40267-YGR	40 characters×2 line	5×8 dots	182×34.5×15.1	161.6×16.5	3.2×5.55

Note: Please refer to page 35~36 about EL back light, Inverter and Extended Temperature Model "H",
Revision includes DMC20481 & DMC24227 on page 34.

DMF Series

(Item) / (Type No.)	Dot Pixels H×W	Dot Size W×H(mm)	Dot Pitch W×H(mm)	Module Dimensions W×H×D(mm)	Active Viewing Area W×H(mm)
DMF633	64×240	0.48×0.48	0.53×0.53	180×75×15	132×39
DMF612	64×480	0.41×0.41	0.47×0.47	260.0×58.0×12.0	229.5×36.0
DMF608	128×160	0.55×0.55	0.6 ×0.6	129.0×102.0×11.2	101.0×82.0
DMF605	128×480	0.41×0.41	0.47×0.47	259.0×90.0×12.6	229.5×66.0
DMF613	200×640	0.31×0.45	0.35×0.49	275.0×126.0×10.8	232.0×106.0
DMF631N	200×640	0.32×0.46	0.35×0.49	275×140×18.5	224×98

Dot Size (W×Hmm)	Recommended Power Supply		Driving Method (Duty)	Power Consumption typ. (mW)	Weight(g)	Operating Temp.(°C)	Storage Temp.(°C)
	Vcc~Vss(V)	Vee~Vss(V)					
0.6×0.7	+5	——	1/11D−1/4B	10	30	0~+50	−20~+70
0.6×0.7	+5	——	1/8D−1/4B	10	30	0~+50	−20~+70
0.6×0.7	+5	——	1/16D−1/5B	10	30	0~+50	−20~+70
0.92×1.1	+5	——	1/16D−1/5B	10	35	0~+50	−20~+70
0.92×1.1	+5	——	1/8D−1/4B	10	40	0~+50	−20~+70
0.55×0.65	+5	——	1/16D−1/5B	10	45	0~+50	−20~+70
0.92×1.1	+5	——	1/16D−1/5B	10	60	0~+50	−20~+70
0.55×0.5	+5	——	1/16D−1/5B	10	40	0~+50	−20~+70
0.55×0.55	+5	——	1/16D−1/5B	20	60	0~+50	−20~+70
0.6×0.65	+5	——	1/8D−1/4B	10	30	0~+50	−20~+70
0.6×0.65	+5	——	1/16D−1/5B	15	45	0~+50	−20~+70
0.6×0.65	+5	——	1/16D−1/5B	10	30	0~+50	−20~+70
0.55×0.55	+5	——	1/16D−1/5B	25	65	0~+50	−20~+70
0.6×0.7	+5	——	1/11D−1/4B	15	55	0~+50	−20~+70
0.6×0.65	+5	——	1/16D−1/5B	15	55	0~+50	−20~+70
0.6×0.7	+5	——	1/11D−1/4B	20	60	0~+50	−20~+70
0.65×0.65	+5	——	1/16D−1/5B	20	60	0~+50	−20~+70
0.6×0.65	+5	——	1/16D−1/5B	20	75	0~+50	−20~+70
0.6×0.7	+5	——	1/11D−1/4B	25	65	0~+50	−20~+70
0.6×0.65	+5	——	1/16D−1/5B	25	75	0~+50	−20~+70
0.5×0.55	+5	——	1/16D−1/5B	50	100	0~+50	−20~+70
0.6×0.7	+5	——	1/16D−1/5B	10	30	0~+50	−20~+70
0.55×0.65	+5	——	1/16D−1/5B	10	30	0~+50	−20~+70
0.6×0.65	+5	——	1/16D−1/5B	25	80	0~+50	−20~+70

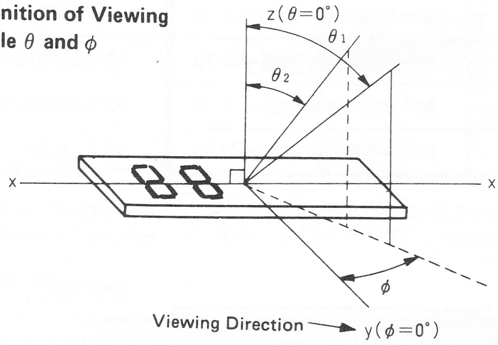
Driving Method	Weight (g)	Operating Temp (°C)	Storage Temp (°C)	Matching Controller LSI
1/32D−1/6B	160	0~+50	−20~+60	HD61830B
1/64D−1/9B	180	0~+50	−20~+60	HD61830B
1/64D−1/9B	170	0~+50	−20~+60	HD61830 MSM6255
1/64D−1/9B	300	0~+50	−20~−60	MSM6255
1/100D−1/11B	379	0~+50	−20~+60	MSM6255 MSM6265
1/100D−1/11B	570	0~+40	−20~+60	MSM6265

OPTICAL CHARACTERISTICS

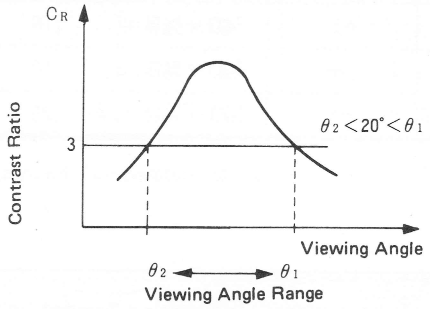
Item		Symbol	Test Condition	Standard Value			Unit
				min.	typ.	max.	
1/8 duty	Liquid Crystal Drive Voltage (Recommended Value)	Vcc～Vee (V_D)	Ta= 0 ℃	3.8	4.2	4.6	V
			Ta=25℃	3.8	4.1	4.5	V
			Ta=50℃	3.6	4	4.3	V
	Visual Angle Range	$\theta_1-\theta_2$	C_R= 3	30	—	—	deg.
	Contrast Ratio	C_R	θ_2=20°、ϕ= 0°	10	—	—	
	Rise Time	τr	V_D=4.1V、θ=20°	—	100	200	mS
	Decay Time	τd	V_D=4.1V、θ=20°	—	100	200	mS
1/11 duty	Liquid Crystal Drive Voltage (Recommended Value)	Vcc～Vee (V_D)	Ta= 0 ℃	4.3	4.4	4.6	V
			Ta=25℃	4	4.1	4.3	V
			Ta=50℃	3.3	3.4	3.6	V
	Visual Angle Range	$\theta_1-\theta_2$	C_R= 3	25	—	—	deg.
	Contrast Ratio	C_R	θ_2=20°、ϕ= 0°	8	—	—	
	Rise Time	τr	V_D=4.5V、θ=20°	—	120	240	mS
	Decay Time	τd	V_D=4.5V、θ=20°	—	120	240	mS
1/16 duty	Liquid Crystal Drive Voltage (Recommended Value)	Vcc～Vee (V_D)	Ta= 0 ℃	4.7	4.8	4.9	V
			Ta=25℃	4.4	4.5	4.6	V
			Ta=50℃	4.1	4.2	4.3	V
	Visual Angle Range	$\theta_1-\theta_2$	C_R= 3	20	—	—	deg.
	Contrast Ratio	C_R	θ_2=20°、ϕ= 0°	6	—	—	
	Rise Time	τr	V_D=4.5V、θ=20°	—	120	240	mS
	Decay Time	τd	V_D=4.5V、θ=20°	—	120	240	mS

※Vcc=5.0V±5%、Ta=25℃

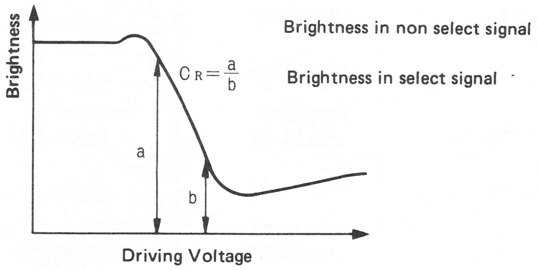
Ⓐ Definition of Viewing Angle θ and ϕ



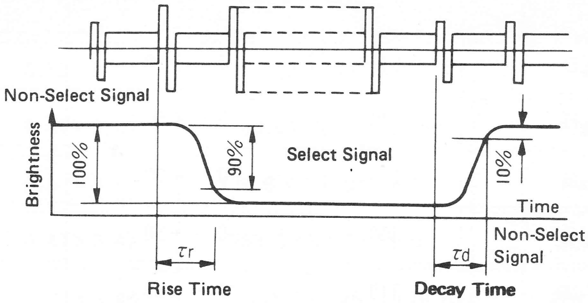
Ⓑ Definition of Viewing Angles θ_2 and θ_1



Ⓒ Definition of Contrast Ratio CR



Ⓓ Definition of Optical Response Time



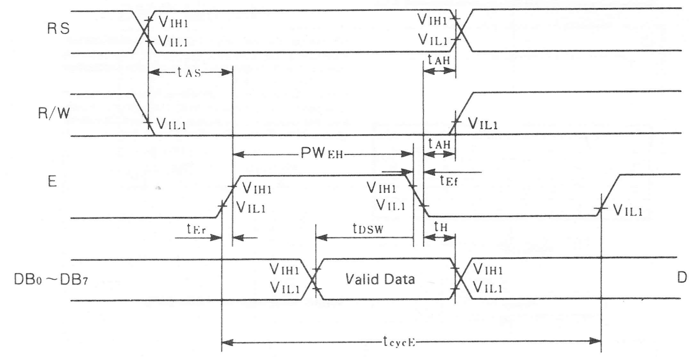
Those time that the brightness of lighting segment reaches 90% from 0% is τr and that reaches 10% from 100% is τd.

TIMING CHART

Item	Symbol	Measuring Condition	Standard Value			Unit
			min.	typ.	max.	
Enable Cycle Time	T_{cycE}	Figs. 1、2	1000	—	—	nS
Enable Pulse Width, High Level	PW_{EH}	Figs. 1、2	450	—	—	nS
Enable Rise and Decay Time	t_{Er},t_{Ef}	Figs. 1、2	—	—	25	nS
Address Setup Time,RS,R/W−E	t_{AS}	Figs. 1、2	140	—	—	nS
Data Delay Time	t_{DDR}	Fig. 2	—	—	320	nS
Data Setup Time	t_{DSW}	Fig. 1	195	—	—	nS
Data Hold Time	t_H	Fig. 1	10	—	—	nS
Data Hold Time	t_{DHR}	Fig. 2	20	—	—	nS
Address Hold Time	t_{AH}	Figs. 1、2	10	—	—	nS

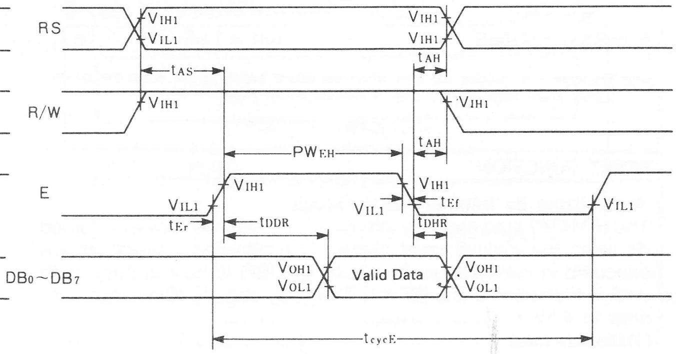
※V_{CC}=5.0V ± 5%、Ta=25℃

FIG. 1 WRITE OPERATION



(Write Data from MPU to MODULE)

FIG. 2 READ OPERATION



(Reading Data from MODULE to MPU)

PIN ASSIGNMENT

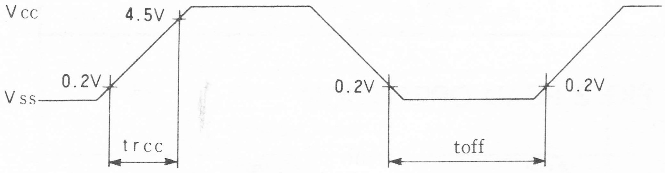
Pin No.	Symbol	Level	Function	
1	Vss	—	Power Supply	0V(GND)
2	Vcc	—		+ 5 V
3	Vee	—		for Liquid Crystal Drive
4	RS	H/L	Register Select	H:Data Input L:Instruction Input
5	R/W	H/L	H:Data Read (Module→MPU) L:Data Write (Module←MPU)	
6	E	H,H←L	Enable Signal	
7	DB0	H/L	Data Bus Line	
8	DB1	H/L		
9	DB2	H/L		
10	DB3	H/L		
11	DB4	H/L		
12	DB5	H/L		
13	DB6	H/L		
14	DB7	H/L		

- ■In the data bus line, data transfer is performed two times by the 4-bit or one time by the 8-bit in order to interface with 4-bit or 8-bit MPU.
- ■In case interface data length is 4-bit. The data is transferred by using only four buses of DB4~DB7 and the buses of DB0~DB3 are not used. The data transfer to MPU is completed by transferring the data of 4-bits twice. Transfer of upper four bits and low four bits is performed in sequence.
- ■In case interface data length is 8-bit. Data transfer is performed by using eight buses of DB0~DB7.

POWER SUPPLY RESET

The internal reset circuit will not be correctly operated, when the following power supply condition is not satisfied. In this case, please perform initial setting according to the instruction.

Item	Symbol	Measuring Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Rise Time	trcc	———	0.1	—	10	mS
Power Supply OFF Time	toff	———	1	—	—	mS



$0.1\text{mS} \leqq t_{rcc} \leqq 10\text{mS}$ $t_{off} \geqq 1\ \text{mS}$

Note: The item toff defines the time when the power supply is off, when the power supply shuts down mementarily or repeats on-off state.

RESET FUNCTION

● Initializing by Internal Reset Circuit

The HD44780 automatically initializes (resets) when power is turned on using the internal reset circuit. The following instructions are executed in initialization. The busy flag (BF) is kept in busy state until initialization ends. (BF=1) The busy state is 10ms after Vcc rises to 4.5V.

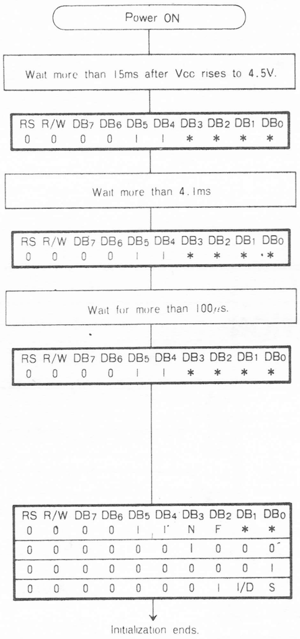
(1) Display clear
(2) Function ser
  DL=1 : 8bit long interface data
  N=0 : 1-line display F=0 : 5×7dot character font
(3) Display ON/OFF control
  D=0 : Display OFF C=0 : Cursor OFF B=0 : Blink OFF
(4) Entry mode set
  I/D=1 : +1(increment) S=0 : No shift

Note : When conditions in "Power Supply Conditions Using Internal Reset Circuit" are not met, the internal reset circuit with not operate normally and initialization will not be performed. In this case initialize by MPU according to "Initializing by Instruction".

● Initializing by Instruction

If the power supply conditions for correctly operating the internal reset circuit are not met, initialization by instruction is required. Use the following procedure for initialization.

When interface is 8 bits long.


Power ON
Wait more than 15ms after Vcc rises to 4.5V.
RS R/W DB7 DB6 DB5 DB4 DB3 DB2 DB1 DB0
0 0 0 0 1 1 * * * *
Wait more than 4.1ms
RS R/W DB7 DB6 DB5 DB4 DB3 DB2 DB1 DB0
0 0 0 0 1 1 * * * *
Wait for more than 100μs.
RS R/W DB7 DB6 DB5 DB4 DB3 DB2 DB1 DB0
0 0 0 0 1 1 * * * *
RS R/W DB7 DB6 DB5 DB4 DB3 DB2 DB1 DB0
0 0 0 0 1 1 N F * *
0 0 0 0 0 0 1 0 0 0
0 0 0 0 0 0 0 0 0 1
0 0 0 0 0 0 0 1 I/D S
Initialization ends.

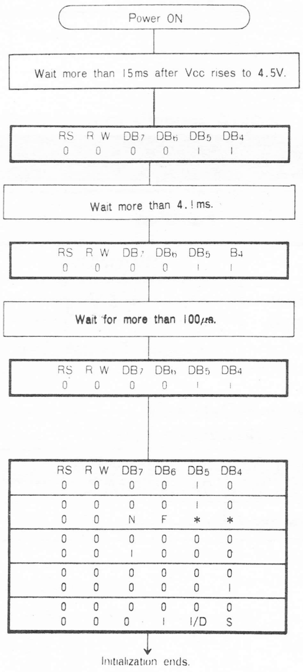
BF cannot be checked before this instruction.
Function set (Interface is 8 bits long.)

BF cannot be checked before this instruction.
Function set (Interface is 8 bits long.)

BF cannot be checked before this instruction.
Function set (Interface is 8 bits long.)

BF can be checked after the following instructions. When BF is not checked, the waiting time between instructions is longer than the execution instruction time. (See Table 4-1)
Function Set (Interface is 8bits long. Specifiy the number of display lines and character font.) The number of display lines and character font cannot be changed afterwards.
Display OFF／Display ON／Entry Mode Set

When interface is 4bits long.



BF cannot be checked before this instruction.
Function set (Interface is 8bits long.)

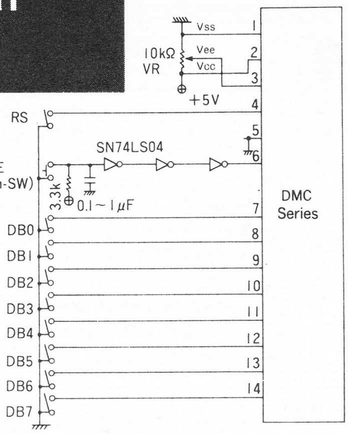
BF cannot be checked before this instruction.
Function set (Interface is 8bits long.)

BF cannot be checked before this instruction.
Function set (Interface is 8bits lengh.)

BF can be checked after the following instructions. When BF is not checked, the waiting time between instructions is longer than the execution instruction time. (See Table 4-1)
Function Set (Set interface to be 4bits long.) Interface is 8bits length. Function Set (Interface is 4bits long. Specify the number of display lines and character font.) The number of display lines and character font cannot be changed afterwards.
Display OFF／Display ON／Entry Mode Set

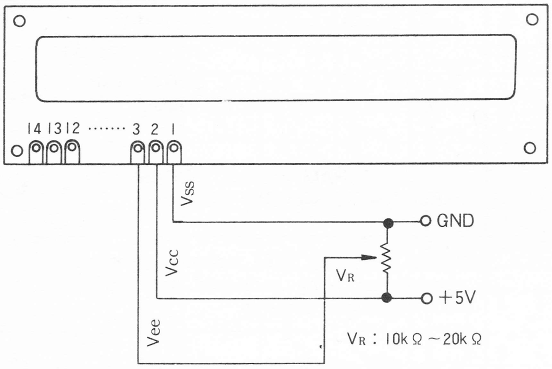
TEST CIRCUIT OF MODULE

SW ON "L" level.
SW OFF "H" level.

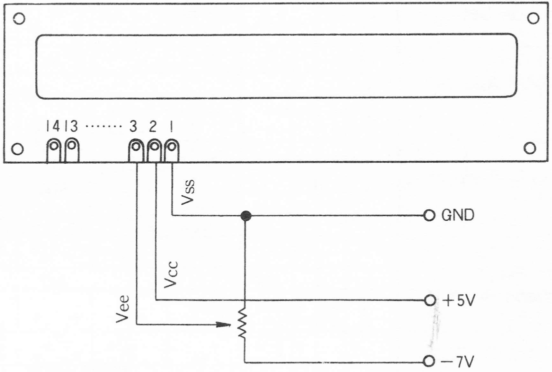


EXAMPLE OF POWER SUPPLY

DMC Module



In case of extended temperature version



※NOTE:When the voltage of Vee is different from the recommended voltage, the viewing angle may be changed.

● Examples of Temperature Compensation Circuits for Extended Temp Type.(Only for reference)

(A) 1/8Duty—1/4Bias

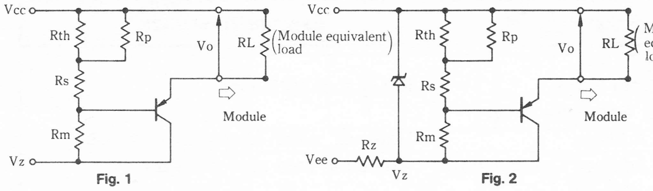
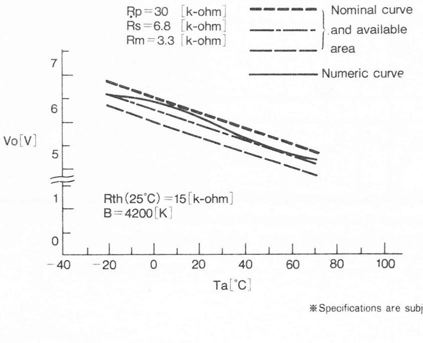


Fig. 1 Fig. 2

Thermistor:Rth(25℃) = 15[k-ohm], B = 4200[K]
Resistors :Rp = 30[k-ohm], Rs = 6.8[k-ohm], Rm = 3.3[k-ohm]
Transistor :PNP Type
Vcc : +5v, Vss : 0v (Logic Suply)
Vz : −8[V](−7.8 to −8.2[V])
Vee < Vz[V], Rz = (Vz − Vee)/5[k-ohm]



Ta[°C]	Vo[V]
−20	6.56
−10	6.50
0	6.40
10	6.26
20	6.09
30	5.88
40	5.67
50	547
60	5.29
70	5.15

(B) 1/16Duty—1/5Bias

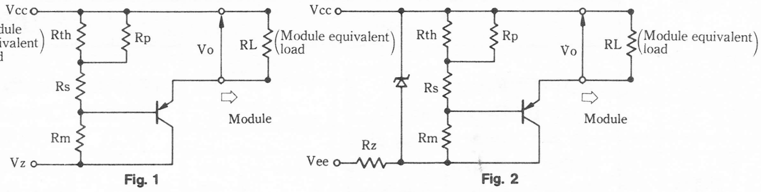
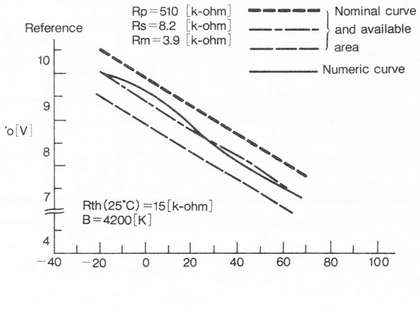


Fig. 1 Fig. 2

Thermistor:Rth(25℃) = 15[k-ohm], B = 4200[K]
Resistors :Rp = 510[k-ohm], Rs = 8.2[k-ohm], Rm = 3.9[k-ohm]
Transistor :PNP Type
Vcc : +5v, Vss : 0v (Logic Suply)
Vz : −11[V](−10.725 to −11.275[V])
Vee < Vz[V], Rz = (Vz − Vee)/5[k-ohm]



Ta[°C]	Vo[V]
−20	10.01
−10	9.84
0	9.60
10	9.28
20	8.89
30	8.49
40	8.11
50	7.79
60	7.53
70	7.33

※Specifications are subject to change without notice.

INSTRUCTIONS

Instruction	Code										Description	Execute Time(max.) (NOTE 1)
	RS	R/W	DB 7	DB 6	DB 5	DB 4	DB 3	DB 2	DB 1	DB 0		
Clear Display	0	0	0	0	0	0	0	0	0	1	Clears all display and returns the cursor to the home position (Address 0).	1.64mS
Cursor At Home	0	0	0	0	0	0	0	0	1	*	Returns the cursor to the home position (Address 0). Also returns the display being shifted to the original position. DDRAM contents remain unchanged.	1.64mS
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	S	Sets the cursor move direction and specifies or not to shift the display. These operations are performed during data write and read.	40μS
Display On/Off Control	0	0	0	0	0	0	1	D	C	B	Sets ON/OFF of all display (D) cursor ON /OFF (C), and blink of cursor position character (B).	40μS
Cursor/Display Shift	0	0	0	0	0	1	S/C	R/L	*	*	Moves the cursor and shifts the display without changing DDRAM contents.	40μS
Function Set	0	0	0	0	1	DL	N	F	*	*	Sets interface dafa length (DL) number of display lines (L) and character font (F).	40μS
CGRAM Address Set	0	0	0	1	ACG						Sets the CGRAM address. CGRAM data is sent and received after this setting.	40μS
DDRAM Address Set	0	0	1	ADD							Sets the DDRAM address. DDRAM data is sent and received after this setting	40μS
Busy Flag/ Address Read	0	1	BF	AC							Reads Busy flag (BF) indicating internal operation is being performed and reads address counter contents.	0μS
CGRAM/DDRAM Data Write	1	0	WRITE DATA								Writes data into DDRAM or CGRAM.	40μS
CGRAM/DDRAM Data Read	1	1	READ DATA								Reads data from DDRAM or CGRAM.	40μS

Code	Description	Execute Time (max.)
I/D =1 : Increment I/D =0 : Decrement S =1 : With display shift S/C=1 : Display shift S/C=0 : Cursor movement R/L=1 : Shift to the right R/L=0 : Shift to the left DL =1 : 8-bit DL =0 : 4-bit N =1 : 1/16Duty N =0 : 1/8Duty, 1/11Duty F =1 : 5×10dots F =0 : 5×7dots BF =1 : Internal operation is being performed BF =0 : Instruction acceptable	DDRAM : Display Data RAM CGRAM : Character Generator RAM ACG : CGRAM Address ADD : DDRAM Address Corresponds to cursor address. AC : Address Counter, used for both DDRAM and CGRAM ※ : Invalid	fcp or fosc=250kHz However, when frequency changes, execution time also changes Ex When fcp or fosc=270kHz, $40\mu S \times \frac{250}{270} = 37\mu S$

FONT TABLE

(5 × 11Dots)

Lower 4-bit \ Upper 4-bit	0000	0010	0011	0100	0101	0110	0111	1010	1011	1100	1101	1110	1111
××××0000	CG RAM (1)		0	@	P	`	p		ー	タ	ミ	α	p
××××0001	(2)	!	1	A	Q	a	q	。	ア	チ	ム	ä	q
××××0010	(3)	"	2	B	R	b	r	「	イ	ツ	メ	β	θ
××××0011	(4)	#	3	C	S	c	s	」	ウ	テ	モ	ε	∞
××××0100	(5)	$	4	D	T	d	t	、	エ	ト	ヤ	μ	Ω
××××0101	(6)	%	5	E	U	e	u	・	オ	ナ	ユ	σ	ü
××××0110	(7)	&	6	F	V	f	v	ヲ	カ	ニ	ヨ	ρ	Σ
××××0111	(8)	'	7	G	W	g	w	ァ	キ	ヌ	ラ	g	π
××××1000	(1)	(	8	H	X	h	x	ィ	ク	ネ	リ	√	x̄
××××1001	(2)	)	9	I	Y	i	y	ゥ	ケ	ノ	ル	⁻¹	y
××××1010	(3)	*	:	J	Z	j	z	ェ	コ	ハ	レ	j	千
××××1011	(4)	+	;	K	[	k	{	ォ	サ	ヒ	ロ	ˣ	万
××××1100	(5)	,	<	L	¥	l	|	ャ	シ	フ	ワ	¢	円
××××1101	(6)	-	=	M	]	m	}	ュ	ス	ヘ	ン	£	÷
××××1110	(7)	.	>	N	^	n	→	ョ	セ	ホ	゛	ñ	
××××1111	(8)	/	?	O	_	o	←	ッ	ソ	マ	゜	ö	█

(5 × 8Dots)

1110	1111
α	p
ä	q
β	θ
ε	∞
μ	Ω
σ	ü
ρ	Σ
g	π
√	x̄
⁻¹	y
j	千
ˣ	万
¢	円
£	÷
ñ	
ö	█

※CG RAM : Character pattern area can be rewritten by program.

DMC16106A

- Display Format(16character ×1line) • Display Fonts(5×11dots) • Driving Method(1/11D)

ABSOLUTE MAXIMUM RATINGS

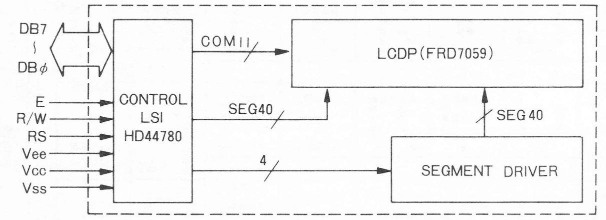
Item	Sym-bol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for	Vcc～Vss	—	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc～Vee	—	0	—	13.5	V
Input Voltage	V_I	—	Vss	—	Vcc	V
Operating Temperature	Ta	—	0	—	+50	℃
Storage Temperature	Tstg	—	−20	—	+70	℃

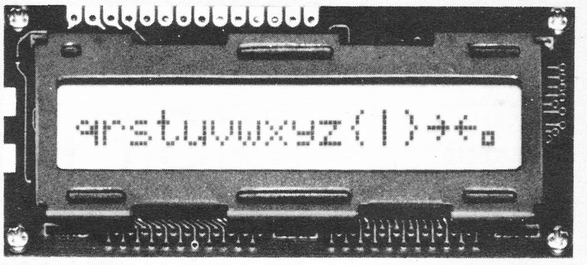
ELECTRICAL CHARACTERISTICS

Item	Sym-bol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	—	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	—	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205mA$	2.4	—	—	V
Output "Low" Voltage	V_{OL}	$I_{OH}=1.2mA$	—	—	0.4	V
Power Supply Current	I_{CC}	Vcc=5.0V	—	0.5	2.0	mA

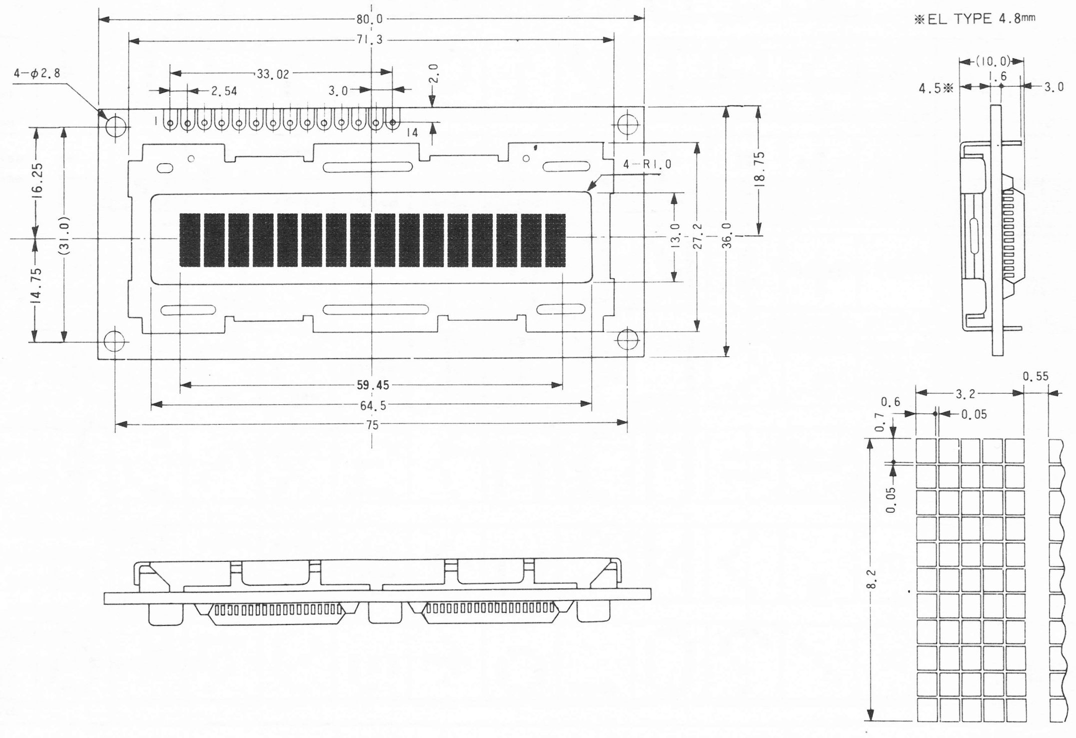
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC16106C

- Display Format(16character ×1line) • Display Fonts(5×8dots) • Driving Method(1/8D)

ABSOLUTE MAXIMUM RATINGS

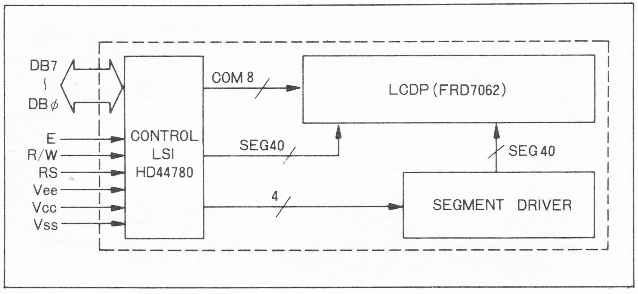
Item	Symbol	Test Condition	Standard Value min.	Standard Value typ.	Standard Value max.	Unit
Power Supply Voltage for Logic	Vcc~Vss	——	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc~Vee	——	0	—	13.5	V
Input Voltage	V_I	——	Vss	—	Vcc	V
Operating Temperature	Ta	——	0	—	+50	℃
Storage Temperature	Tstg	——	−20	—	+70	℃

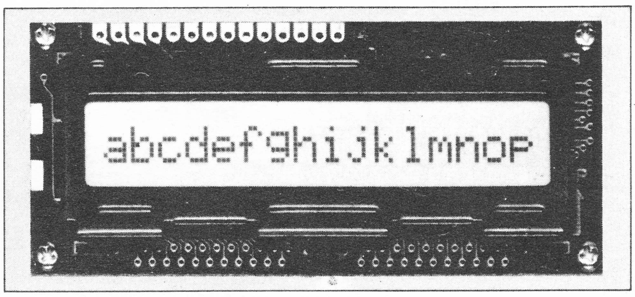
ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value min.	Standard Value typ.	Standard Value max.	Unit
Input "High" Voltage	V_{IH}	——	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	——	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}$=0.205mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	I_{OH}=1.2mA	—	—	0.4	V
Power Supply Current	I_{CC}	Vcc=5.0V	—	0.5	2.0	mA

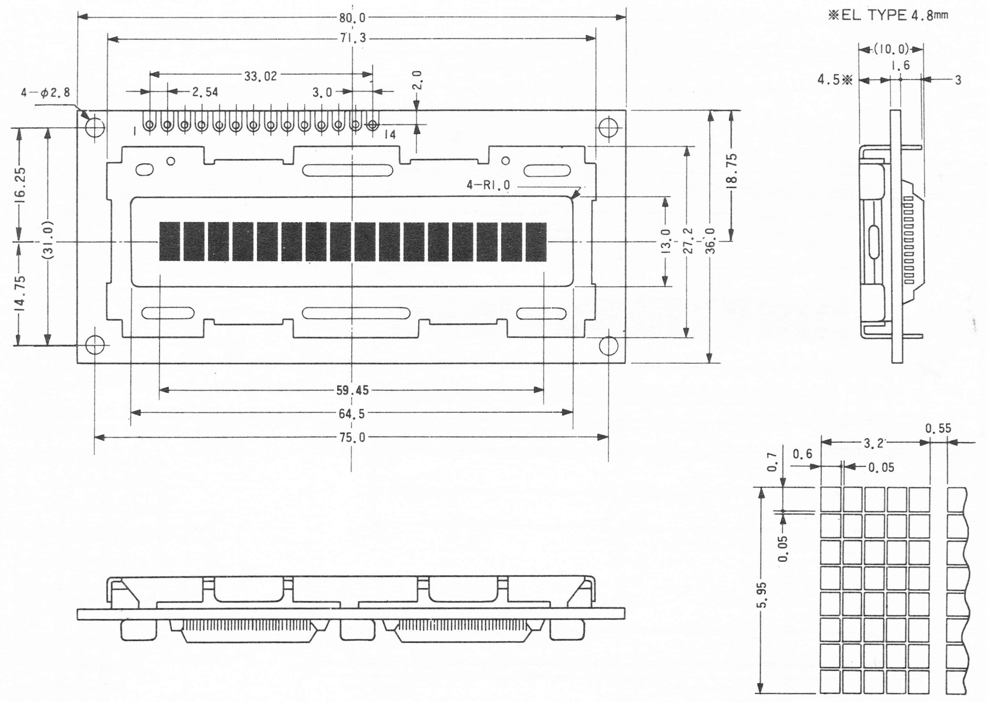
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC16117A

• Display Format(16character ×1line) • Display Fonts(5×8dots) • Driving Method(1/16D)

ABSOLUTE MAXIMUM RATINGS

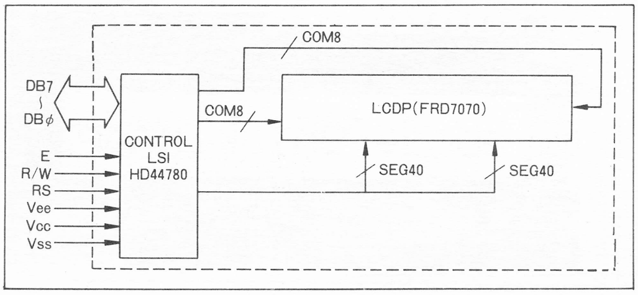
Item	Symbol	Test Condition	Standard Value min.	Standard Value typ.	Standard Value max.	Unit
Power Supply Voltage for Logic	Vcc～Vss	——	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc～Vee	——	0	—	13.5	V
Input Voltage	V_I	——	Vss	—	Vcc	V
Operating Temperature	Ta	——	0	—	+50	℃
Storage Temperature	Tstg	——	−20	—	+70	℃

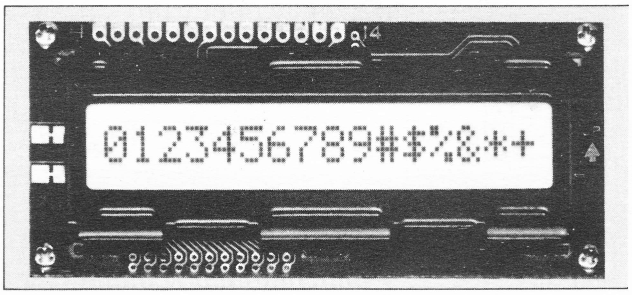
ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value min.	Standard Value typ.	Standard Value max.	Unit
Input "High" Voltage	V_{IH}	——	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	——	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205$mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	$I_{OH}=1.2$mA	—	—	0.4	V
Power Supply Current	Icc	Vcc=5.0V	—	0.5	2.0	mA

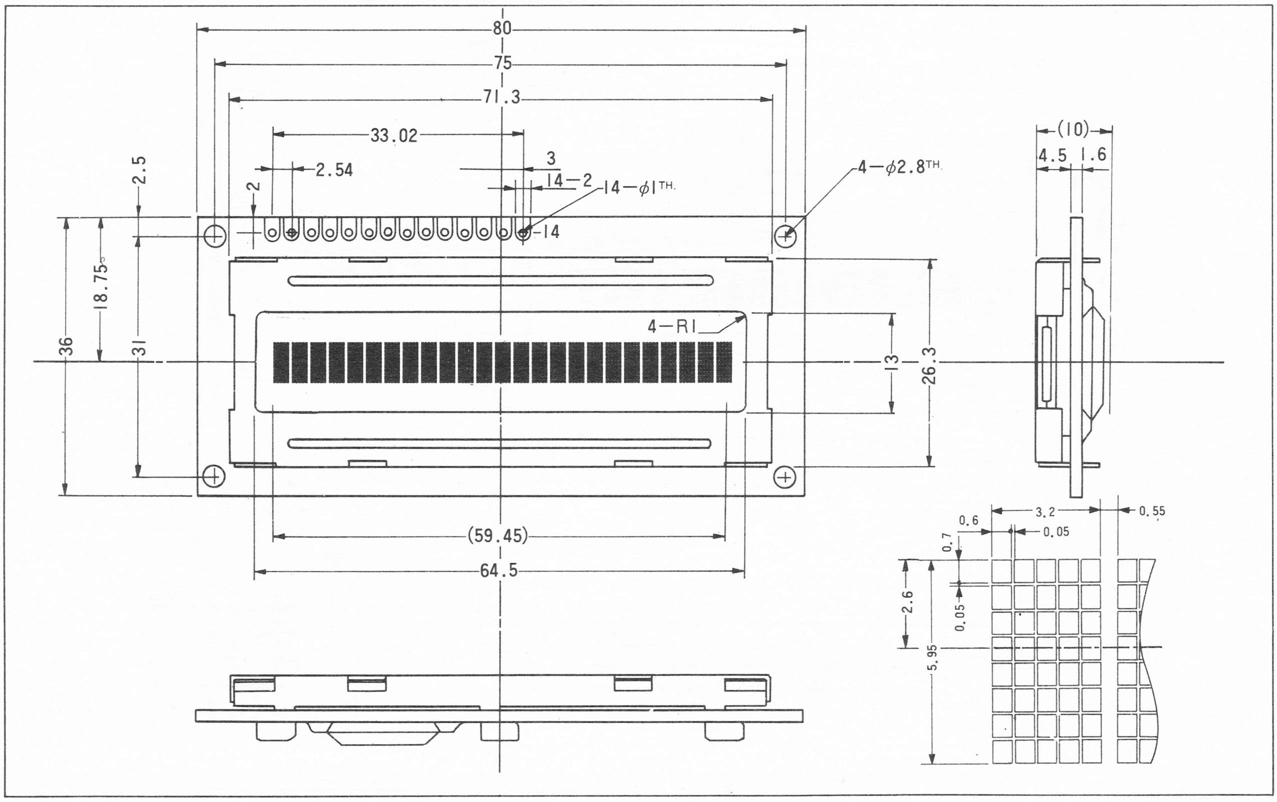
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC16128

● Display Format(16character ×1line) ● Display Fonts(5×7dots+cursor) ● Driving(1/16D)

ABSOLUTE MAXIMUM RATINGS

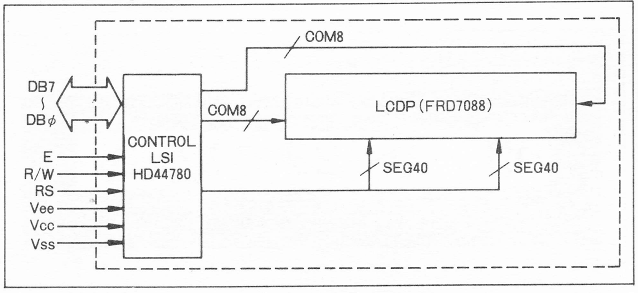
Item	Sym-bol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	Vcc~Vss	——	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc~Vee	——	0	—	13.5	V
Input Voltage	V_I	——	Vss	—	Vcc	V
Operating Temperature	Ta	——	0	—	+50	℃
Storage Temperature	Tstg	——	−20	—	+70	℃

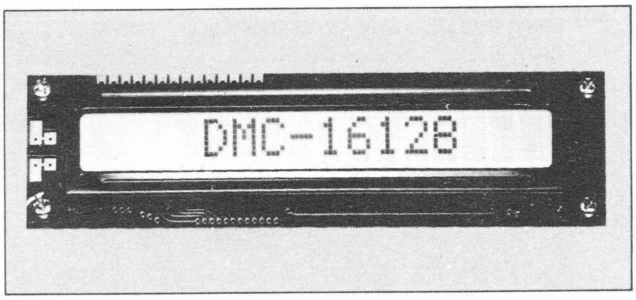
ELECTRICAL CHARACTERISTICS

Item	Sym-bol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	——	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	——	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}$=0.205mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	I_{OH}=1.2mA	—	—	0.4	V
Power Supply Current	Icc	Vcc=5.0V	—	0.5	2.0	mA

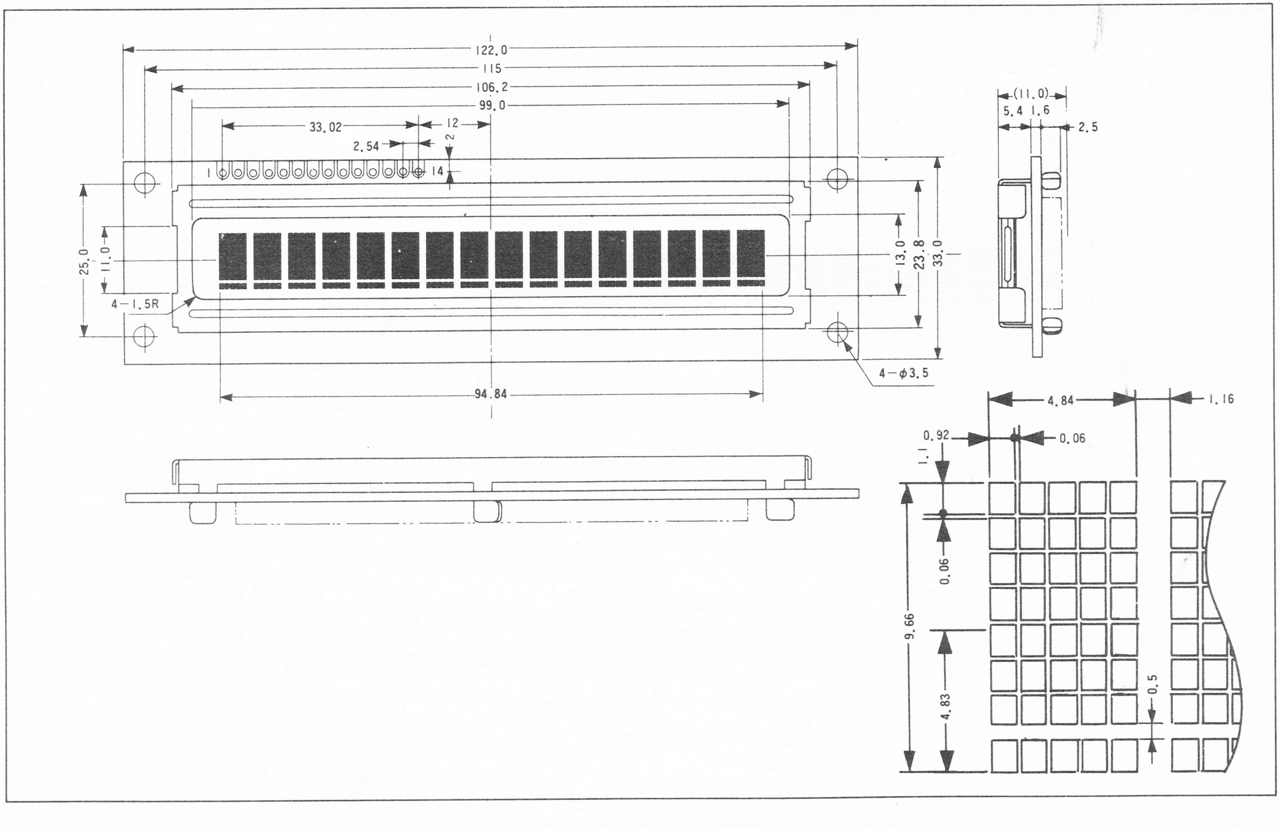
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC16129

- Display Format(16character ×1line) • Display Fonts(5×7dots+cursor) • Driving Method(1/8D)

ABSOLUTE MAXIMUM RATINGS

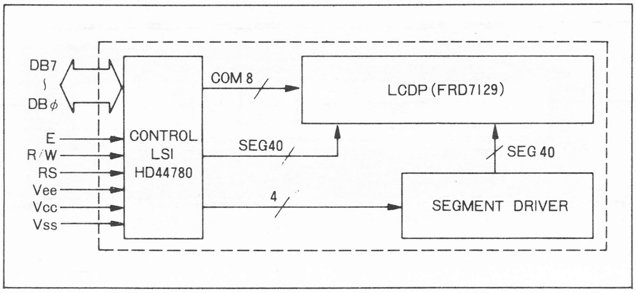
Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	Vcc～Vss	—	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc～Vee	—	0	—	13.5	V
Input Voltage	V_I	—	Vss	—	Vcc	V
Operating Temperature	Ta	—	0	—	+50	℃
Storage Temperature	Tstg	—	−20	—	+70	℃

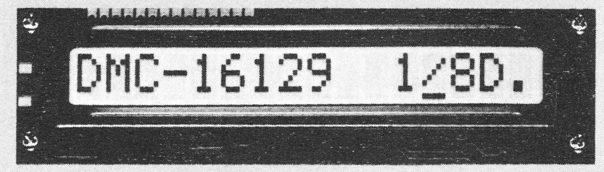
ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	—	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	—	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}$=0.205mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	I_{OH}=1.2mA	—	—	0.4	V
Power Supply Current	I_{CC}	Vcc=5.0V	—	0.5	2.0	mA

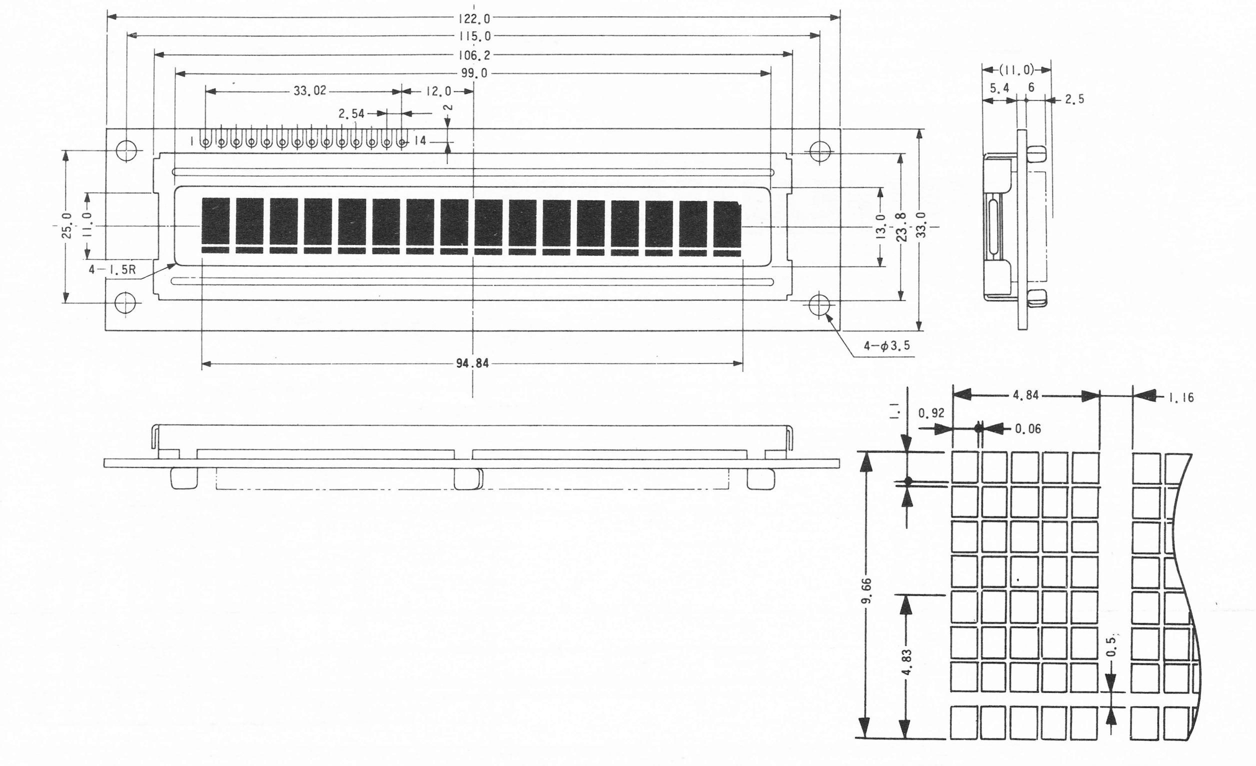
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC16207

●Display Format (16character ×2 line) ●Display Fonts(5×8dots) ●Driving Method(1/16D)

ABSOLUTE MAXIMUM RATINGS

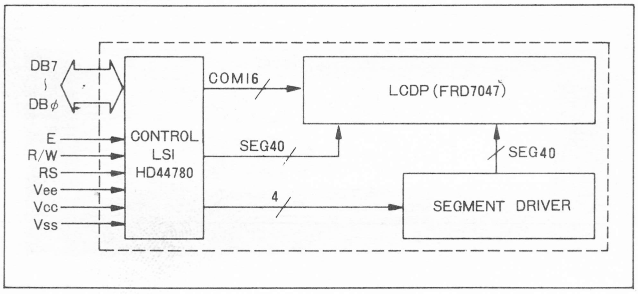
Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	V_{cc}~V_{ss}	——	0	—	7	V
Power Supply Voltage for LCD Drive	V_{cc}~V_{ee}	——	0	—	13.5	V
Input Voltage	V_I	——	V_{ss}	—	V_{cc}	V
Operating Temperature	Ta	——	0	—	+50	℃
Storage Temperature	Tstg	——	−20	—	+70	℃

ELECTRICAL CHARACTERISTICS

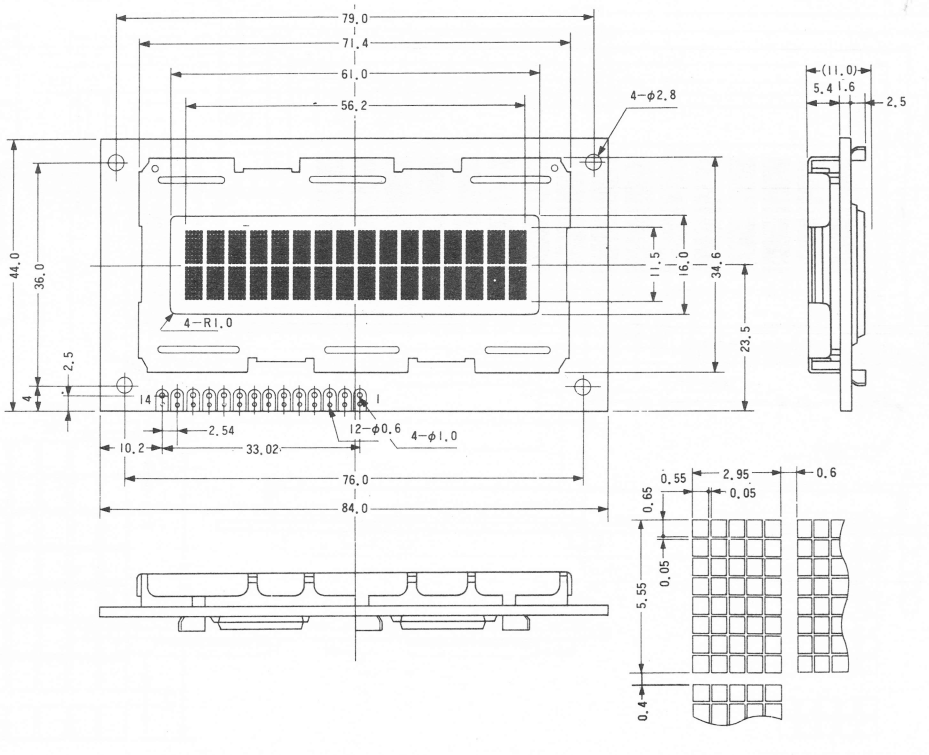
Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	——	2.2	—	V_{cc}	V
Input "Low" Voltage	V_{IL}	——	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205$mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	$I_{OH}=1.2$mA	—	—	0.4	V
Power Supply Current	I_{cc}	$V_{cc}=5.0$V	—	0.5	2.0	mA

※$V_{cc}=5.0V\pm5\%$, Ta=25°C

Block diagram



External dimensions / Display pattern



DMC16230

● Display Format (16 character ×2 line) ● Display Fonts (5×7 dots + cursor) ● Driving Method (1/16 D)

ABSOLUTE MAXIMUM RATINGS

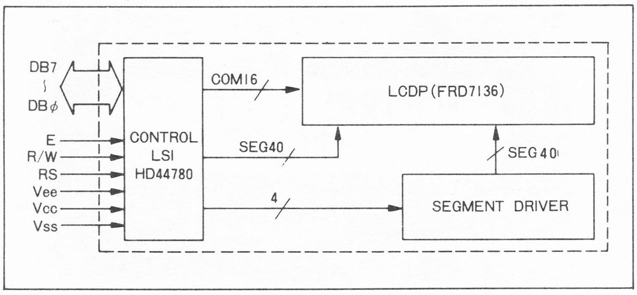
Item	Symbol	Test Condition	Standard Value min.	Standard Value typ.	Standard Value max.	Unit
Power Supply Voltage for Logic	Vcc~Vss	——	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc~Vee	——	0	—	13.5	V
Input Voltage	V_I	——	Vss	—	Vcc	V
Operating Temperature	Ta	——	0	—	+50	℃
Storage Temperature	Tstg	——	−20	—	+70	℃

ELECTRICAL CHARACTERISTICS

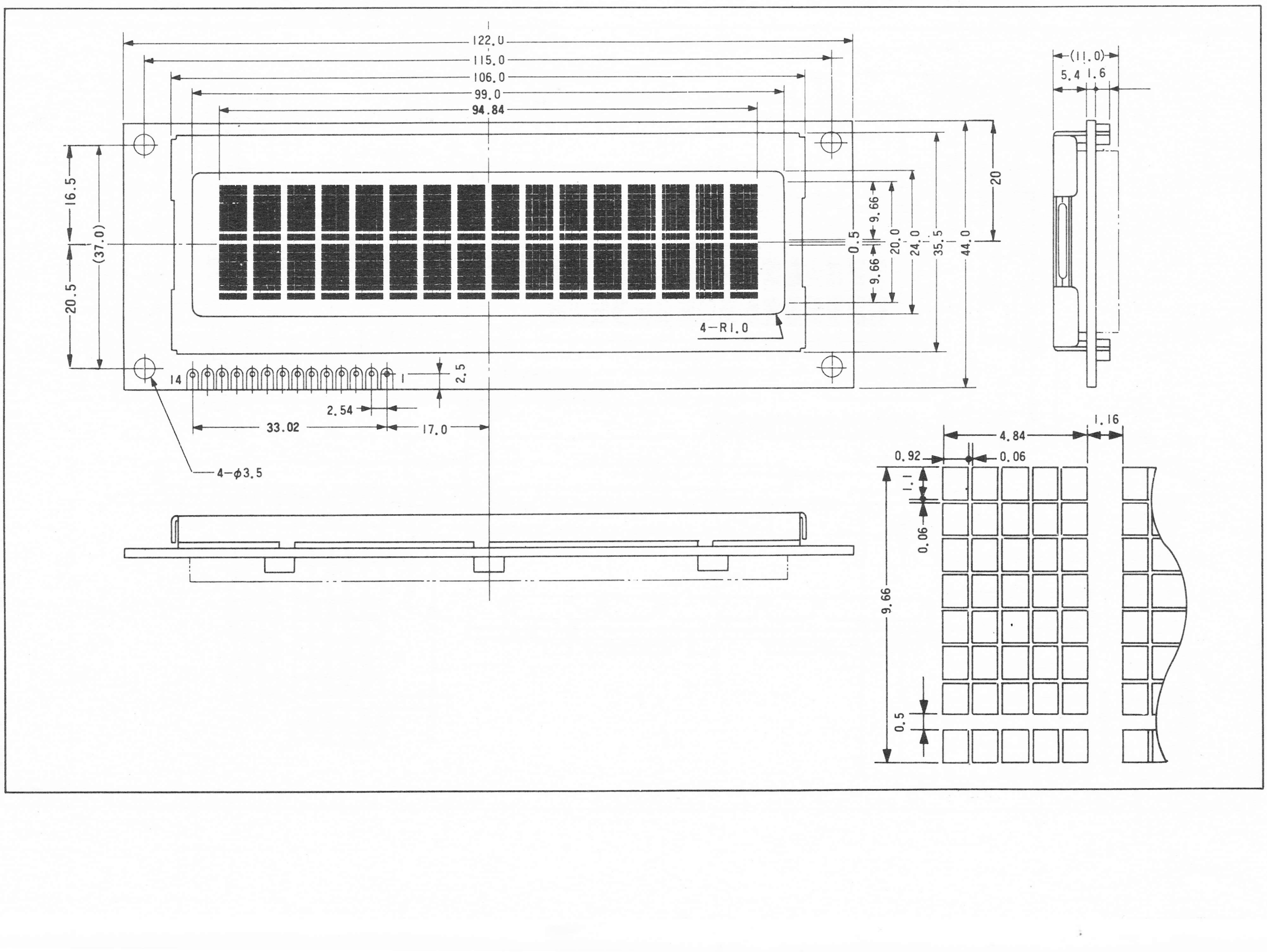
Item	Symbol	Test Condition	Standard Value* min.	Standard Value* typ.	Standard Value* max.	Unit
Input "High" Voltage	V_{IH}	——	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	——	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205\,mA$	2.4	—	—	V
Output "Low" Voltage	V_{OL}	$I_{OH}=1.2\,mA$	—	—	0.4	V
Power Supply Current	I_{CC}	Vcc=5.0V	—	0.5	2.0	mA

※Vcc=5.0V±5%, Ta=25°C

Block diagram



External dimensions / Display pattern



DMC16249

●Display Format(16character +2line) ● Display Fonts(5×8dots) ● Driving method(1/16D)

ABSOLUTE MAXIMUM RATINGS

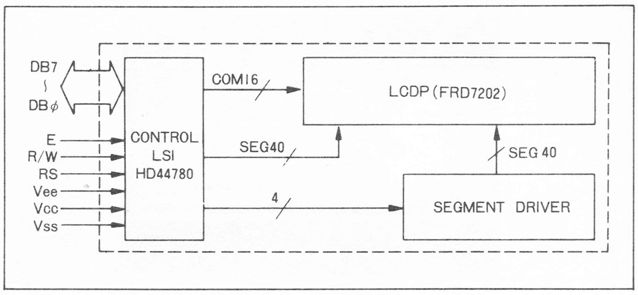
Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	Vcc~Vss	—	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc~Vee	—	0	—	13.5	V
Input "High" Voltage	V_I	—	Vss	—	Vcc	V
Operating Temperature	Ta	—	0	—	+50	℃
Storage Temperature	Tstg	—	−20	—	+70	℃

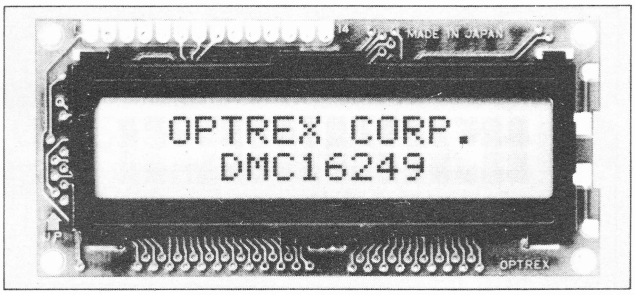
ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input Voltage	V_{IH}	—	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	—	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205mA$	2.4	—	—	V
Output "Low" Voltage	V_{OL}	$I_{OH}=1.2mA$	—	—	0.4	V
Power Supply Current	I_{CC}	Vcc=5.0V	—	0.5	2.0	mA

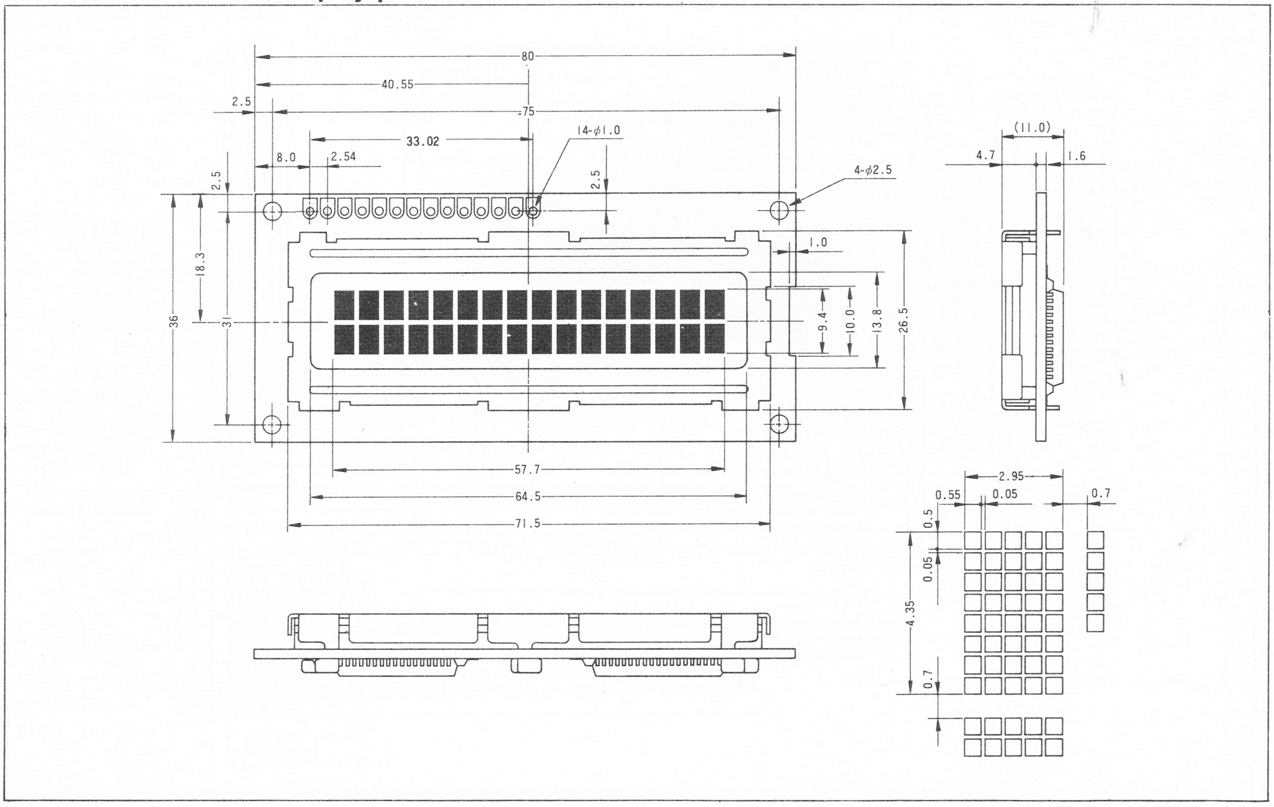
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC16433

- Display Format(16chacter ×4line) • Display Fonts(5×8dots) • Driving Method(1/16D)

ABSOLUTE MAXIMUM RATINGS

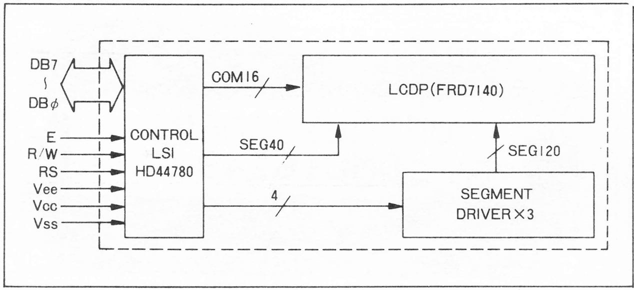
Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	Vcc~Vss	——	0	—	6.5	V
Power Supply Voltage for LCD Drive	Vcc~Vee	——	0	—	6.0	V
Input Voltage	V_I	——	Vss	—	Vcc	V
Operating Temperature	Ta	——	0	—	+50	℃
Storage Temperature	Tstg	——	−20	—	+70	℃

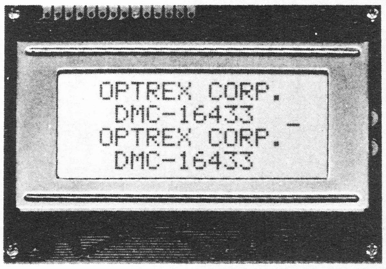
ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	——	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	——	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205$mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	$I_{OH}=1.2$mA	—	—	0.4	V
Power Supply Current	I_{CC}	Vcc=5.0V	—	2.4	4.0	mA

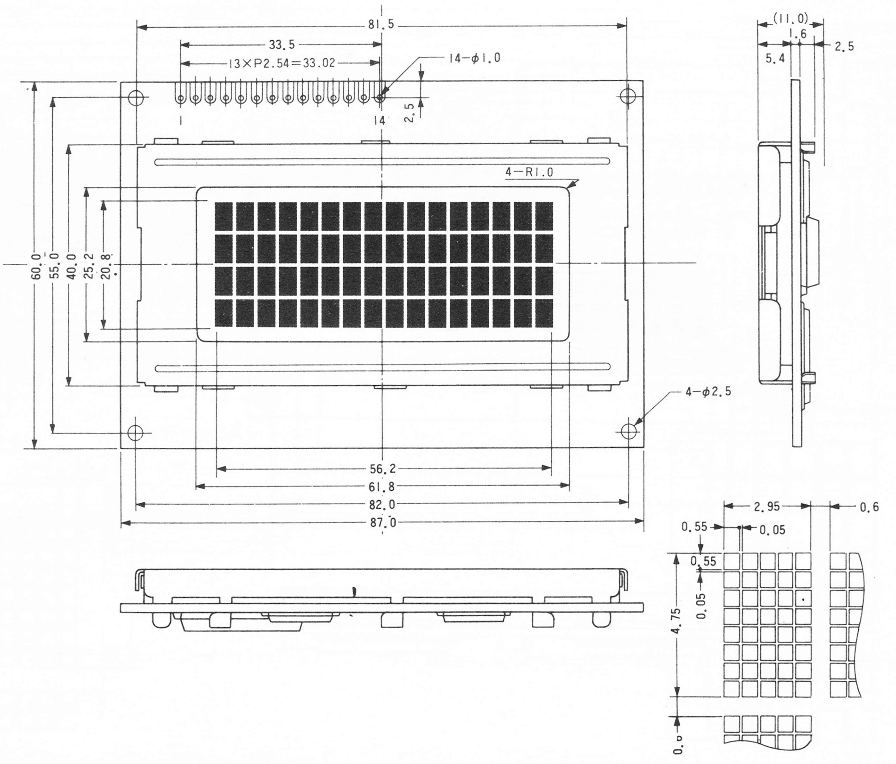
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC20171

● Display Format(20characters×1line) ● Display Fonts(5×7dots+cursor) ● Driving Method(1/8D)

ABSOLUTE MAXIMUM RATINGS

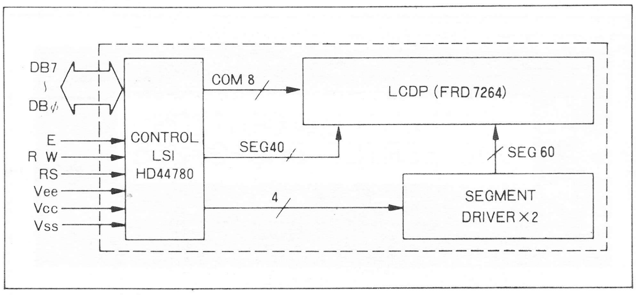
Item	Sym-bol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	Vcc~Vss	—	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc~Vee	—	0	—	13.5	V
Input Voltage	V_I	—	Vss	—	Vcc	V
Operating Temperature	Ta	—	0	—	+50	℃
Storage Temperature	Tstg	—	−20	—	+70	℃

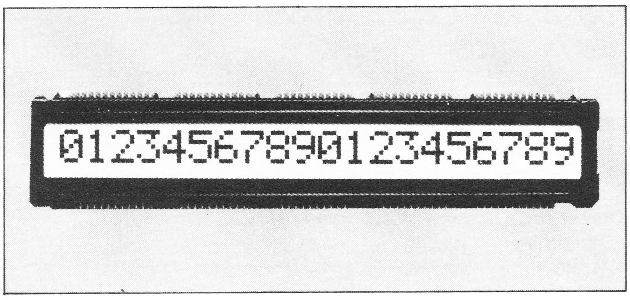
ELECTRICAL CHARACTERISTICS

Item	Sym-bol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	—	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	—	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205$mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	$I_{OH}=1.2$mA		—	0.4	V
Power Supply Current	I_{CC}	Vcc=5.0V		1.5	3.0	mA

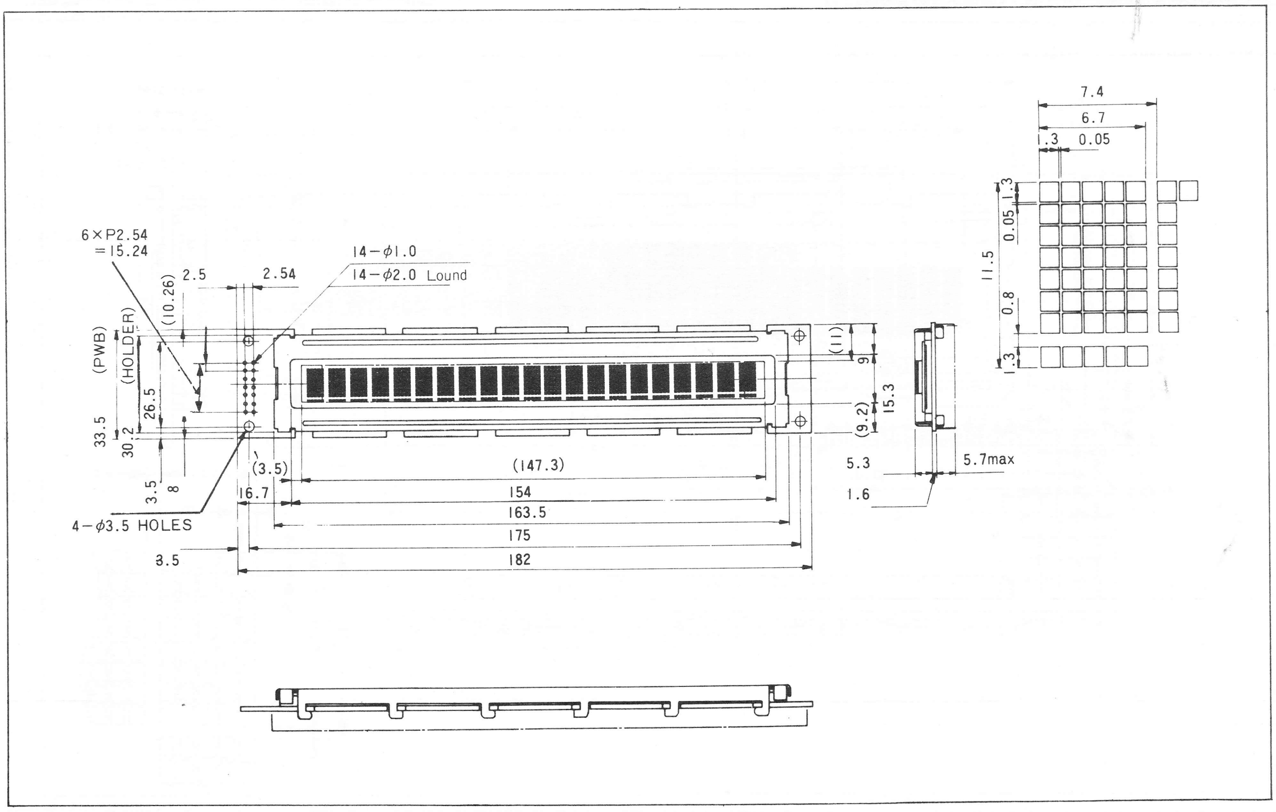
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC20215

- Display Format(20character ×2line) ● Display Fonts(5×8dots) ● Driving Method(1/16D)

ABSOLUTE MAXIMUM RATINGS

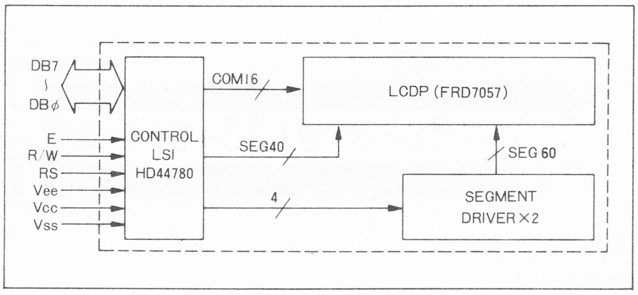
Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	Vcc～Vss	—	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc～Vee	—	0	—	13.5	V
Input Voltage	V_I	—	Vss	—	Vcc	V
Operating Temperature	Ta	—	0	—	+50	℃
Storage Temperature	Tstg	—	−20	—	+70	℃

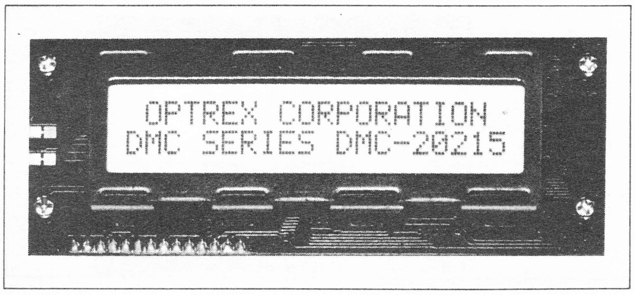
ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	—	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	—	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205mA$	2.4	—	—	V
Output "Low" Voltage	V_{OL}	$I_{OH}=1.2mA$	—	—	0.4	V
Power Supply Current	Icc	Vcc=5.0V	—	1.5	3.0	mA

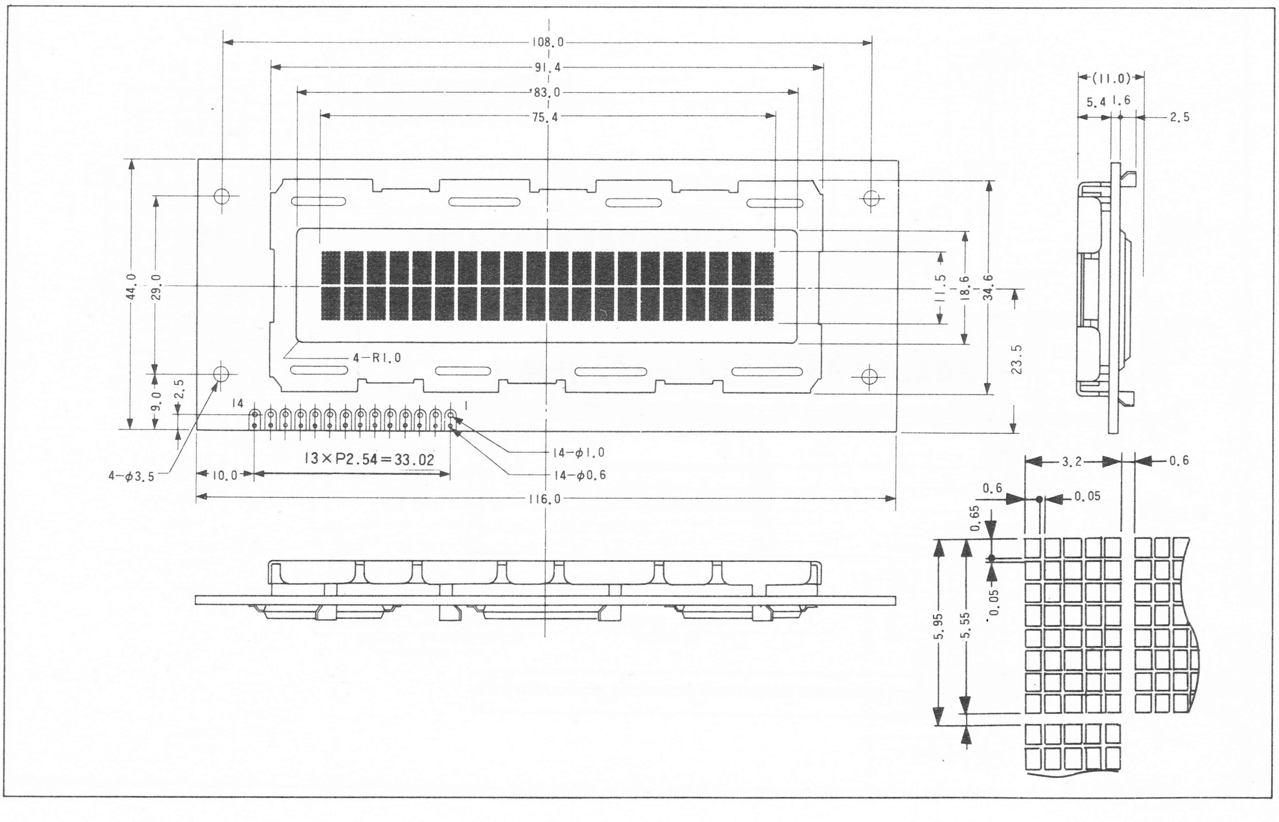
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC20261

- Display Format(20character ×2line) ● Display Fonts(5×8dots) ● Driving Method(1/16D)

ABSOLUTE MAXIMUM RATINGS

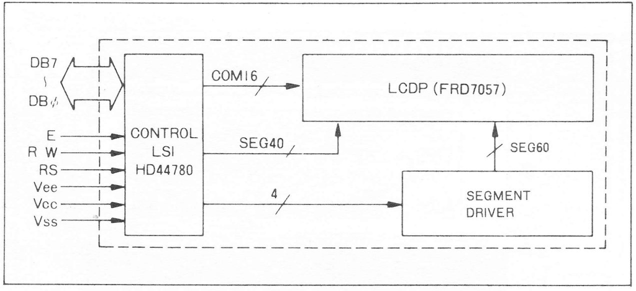
Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	Vcc~Vss	—	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc~Vee	—	0	—	13.5	V
Input Voltage	V_I	—	Vss	—	Vcc	V
Operating Temperature	Topr		0	—	+50	℃
Storage Temperature	Tstg		−20	—	+70	℃

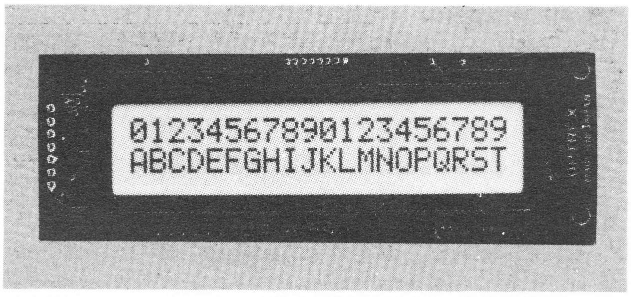
ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	—	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	—	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}$=0.205mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	I_{OH}=1.2mA	—	—	0.4	V
Power Supply Current	I_{CC}	Vcc=5.0V	—	1.5	3.0	mA

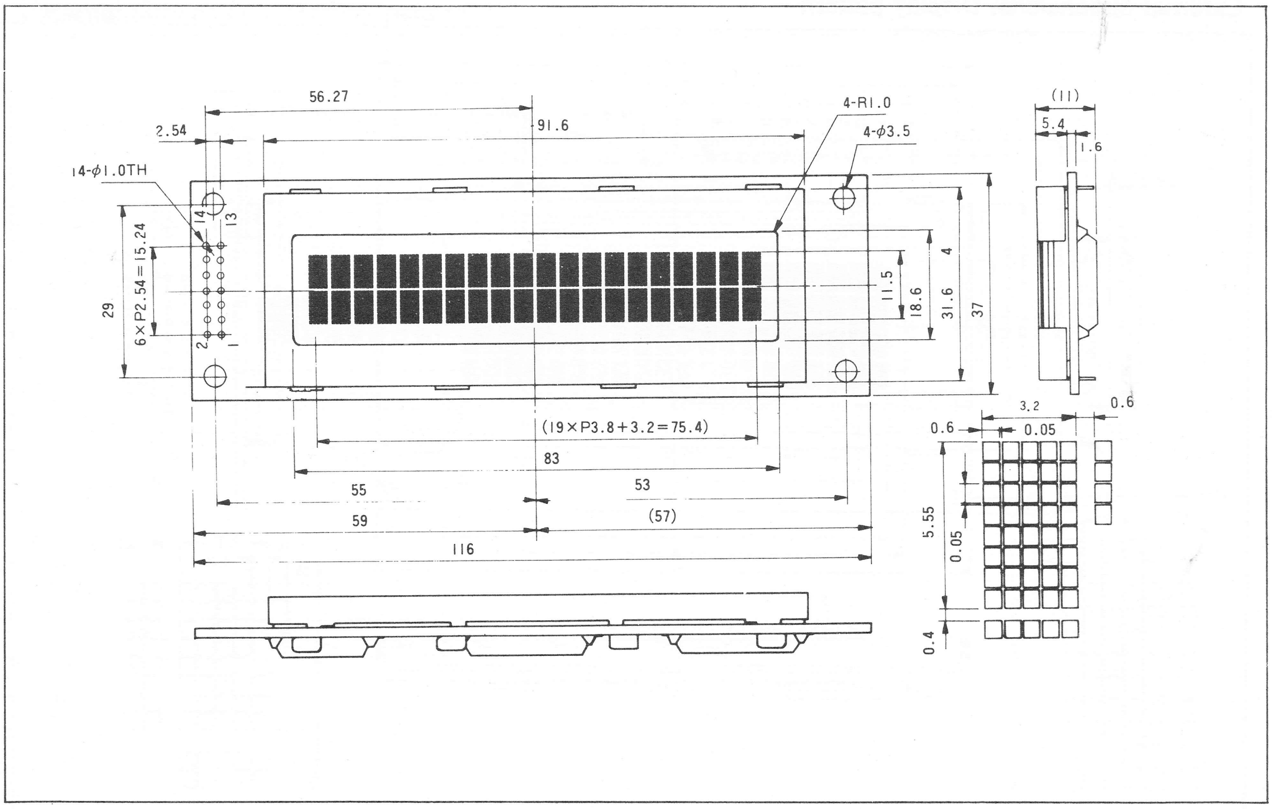
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC20434

● Display Format(20character ×4line) ● Display Fonts(5×8dots) ● Driving Method(1/16D)

ABSOLUTE MAXIMUM RATINGS

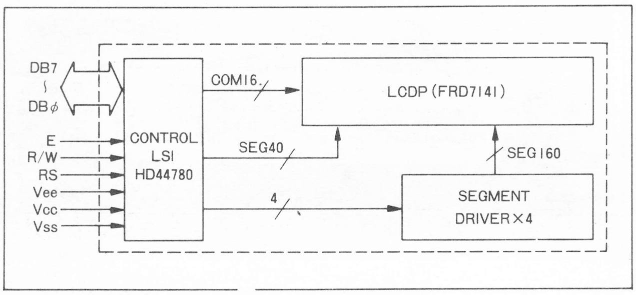
Item	Sym-bol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	Vcc~Vss	——	0	—	6.5	V
Power Supply Voltage for LCD Drive	Vcc~Vee	——	0	—	6.0	V
Input Voltage	V_I	——	Vss	—	Vcc	V
Operating Temperature	Ta	——	0	—	+50	℃
Storage Temperature	Tstg	——	−20	—	+70	℃

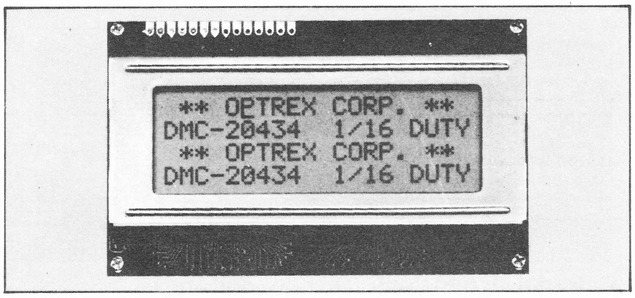
ELECTRICAL CHARACTERISTICS

Item	Sym-bol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	——	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	——	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205mA$	2.4	—	—	V
Output "Low" Voltage	V_{OL}	$I_{OH}=1.2mA$	—	—	0.4	V
Power Supply Current	Icc	Vcc=5.0V	—	2.0	5.0	mA

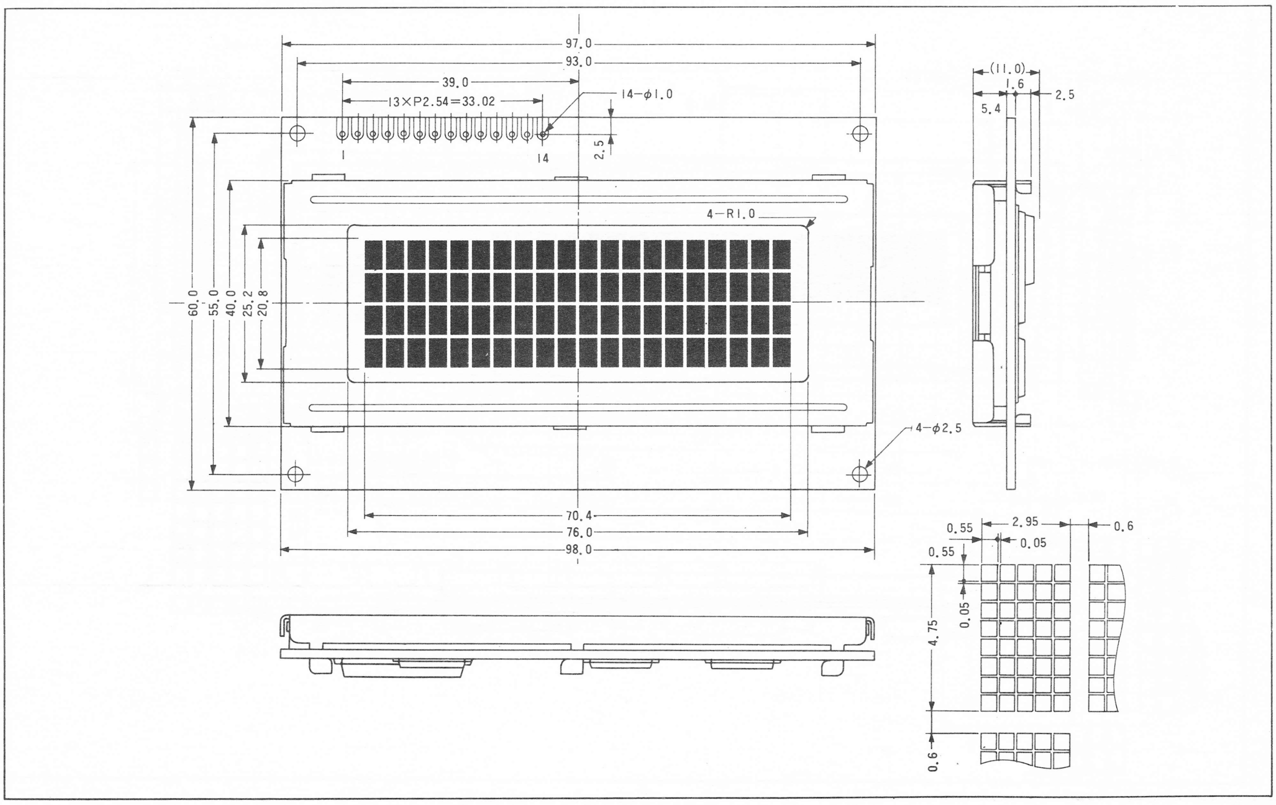
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC24138

● Display Format(24character ×1line) ● Display Fonts(5×11dots) ● Driving Method(1/11D)

ABSOLUTE MAXIMUM RATINGS

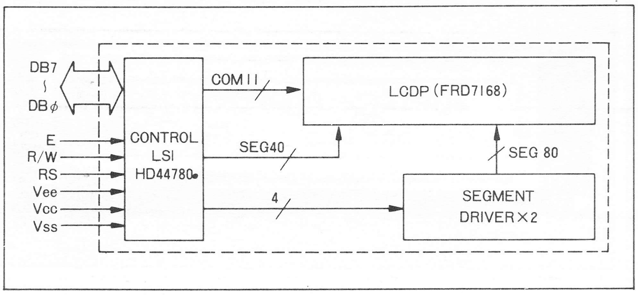
Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	V_{cc}~V_{ss}	—	0	—	7	V
Power Supply Voltage for LCD Drive	V_{cc}~V_{ee}	—	0	—	13.5	V
Input Voltage	V_I	—	Vss	—	Vcc	V
Operating Temperature	Ta	—	0	—	+50	℃
Storage Temperature	Tstg	—	−20	—	+70	℃

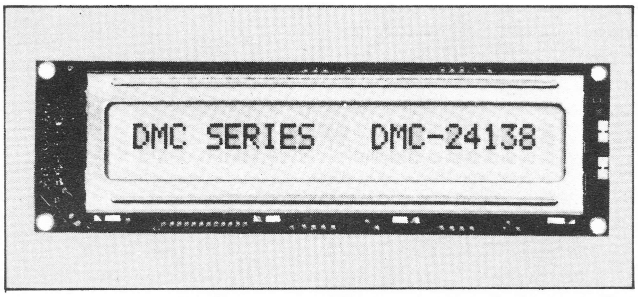
ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	—	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	—	−0.3	—	0.6	V
Output"High"Voltage	V_{OH}	$-I_{OH}=0.205mA$	2.4	—	—	V
Output "Low" Voltage	V_{OL}	$I_{OH}=1.2mA$	—	—	0.4	V
Power Supply Current	I_{cc}	$V_{cc}=5.0V$	—	1.5	3.0	mA

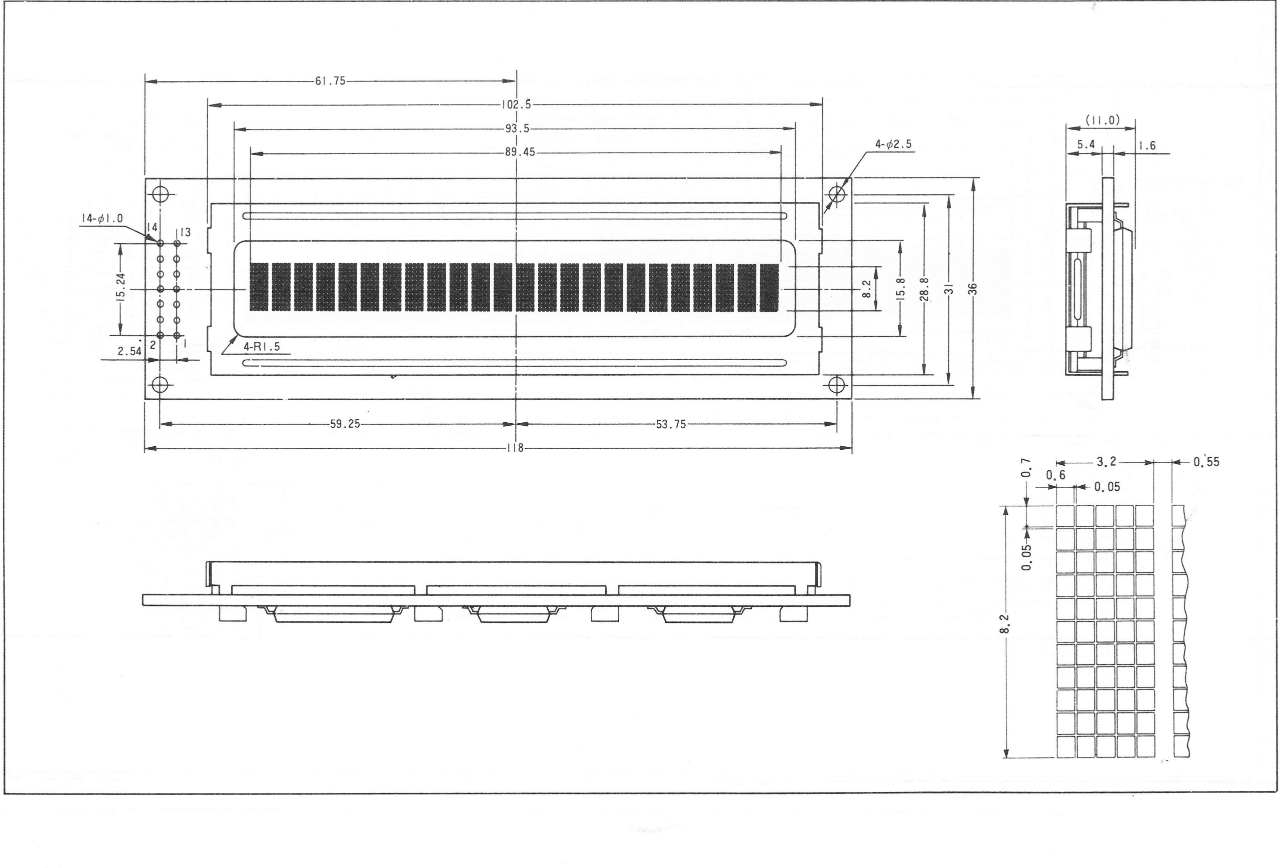
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC24227

- Display Format(24character ×2line) ● Display Fonts(5×8dots) ● Driving Method(1/16D)

ABSOLUTE MAXIMUM RATINGS

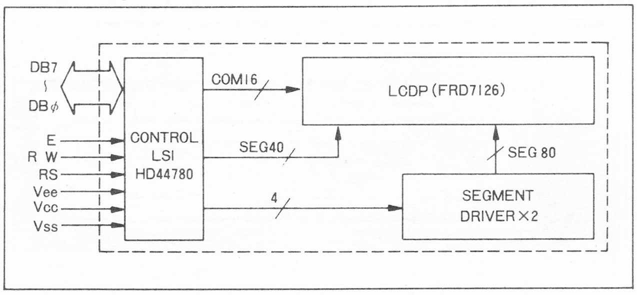
Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	Vcc~Vss	——	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc~Vee	——	0	—	13.5	V
Input Voltage	V_I	——	Vss	—	Vcc	V
Operating Temperature	Ta	——	0	—	+50	℃
Storage Temperature	Tstg	——	−20	—	+70	℃

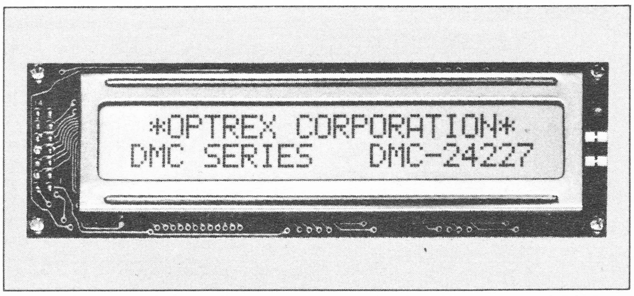
ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	——	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	——	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}$=0.205mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	I_{OH}=1.2mA	—	—	0.4	V
Power Supply Current	I_{CC}	Vcc=5.0V	—	1.5	3.0	mA

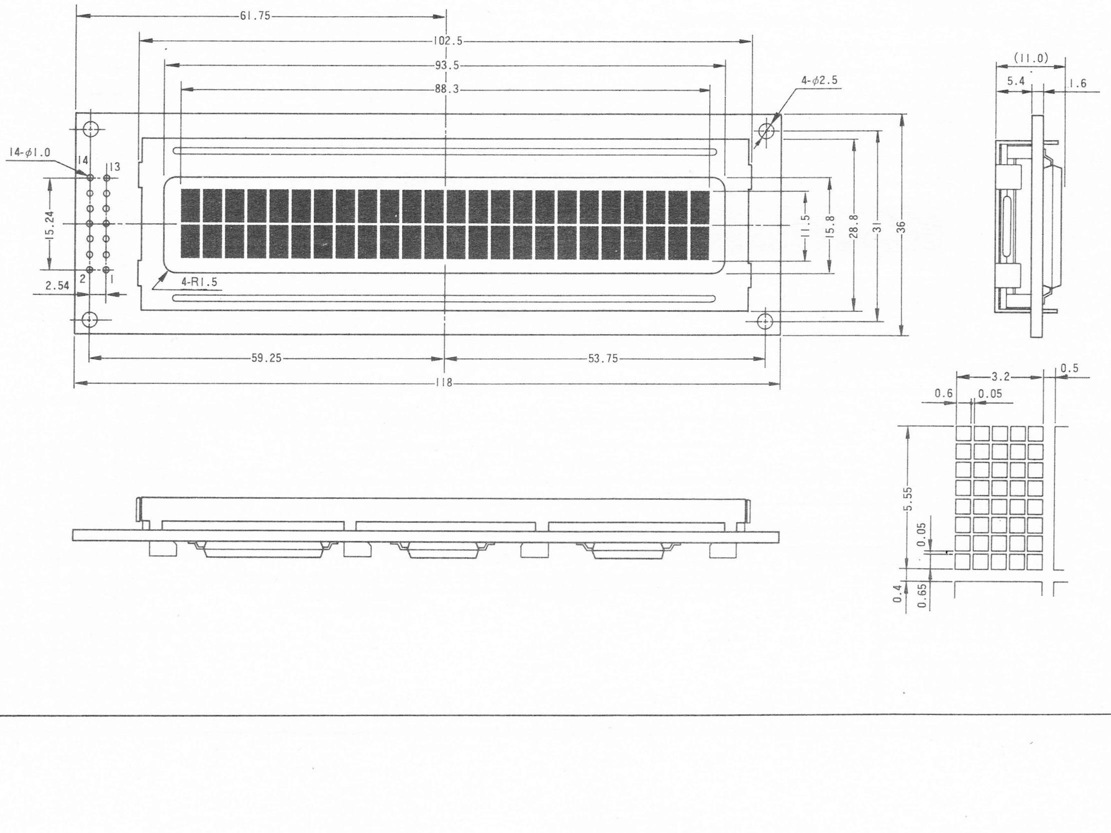
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC32132

- Display Format(32character ×1line) • Display Fonts(5×11dots) • Driving Method(1/11D)

ABSOLUTE MAXIMUM RATINGS

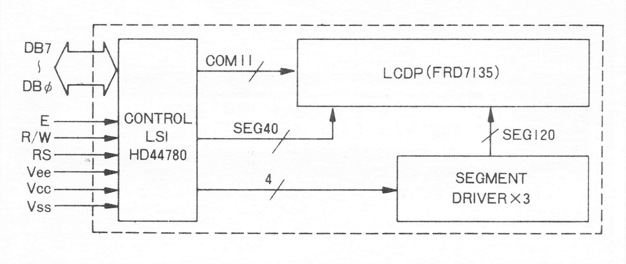
Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	V_{CC}~V_{SS}	—	0	—	7	V
Power Supply Voltage for LCD Drive	V_{CC}~V_{EE}	—	0	—	13.5	V
Input Voltage	V_I	—	V_{SS}	—	V_{CC}	V
Operating Temperature	Ta	—	0	—	+50	℃
Storage Temperature	Tstg	—	−20	—	+70	℃

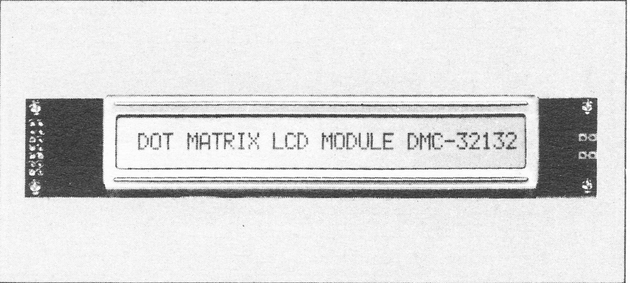
ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	—	2.2	—	V_{CC}	V
Input "Low" Voltage	V_{IL}	—	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205mA$	2.4	—	—	V
Output "Low" Voltage	V_{OL}	$I_{OH}=1.2mA$	—	—	0.4	V
Power Supply Current	I_{CC}	$V_{CC}=5.0V$	—	2.0	4.0	mA

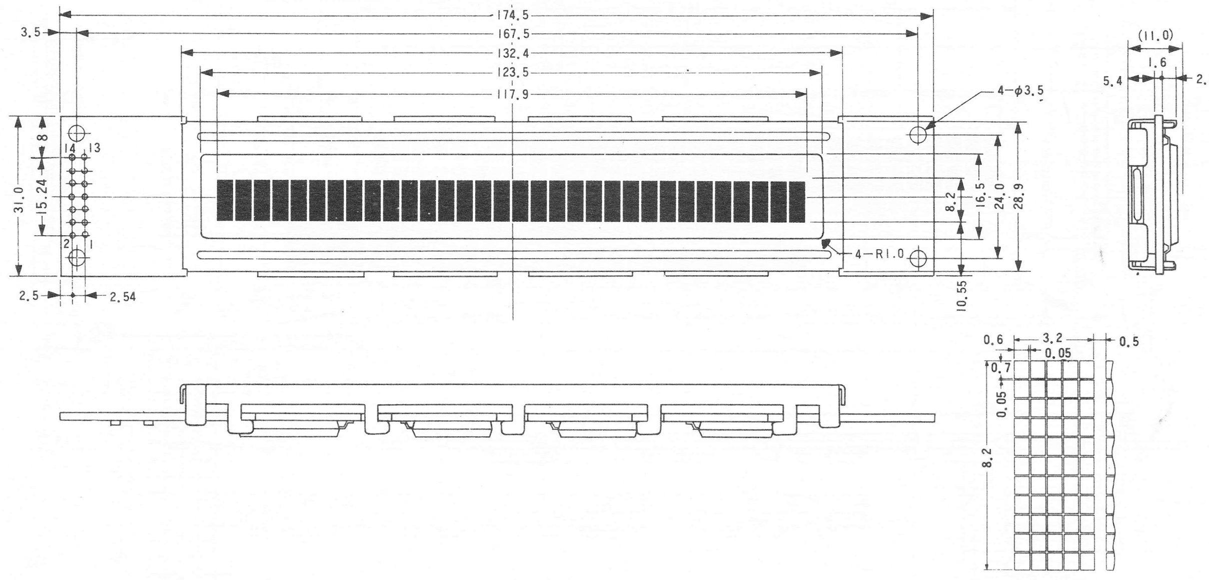
※$V_{CC}=5.0V \pm 5\%$, $Ta=25°C$

Block diagram





External dimensions / Display pattern



DMC32239

● Dispiay Format(32character ×2line) ● Display Fonts(5×8dots) ● Driving Method(1/16D)

ABSOLUTE MAXIMUM RATINGS

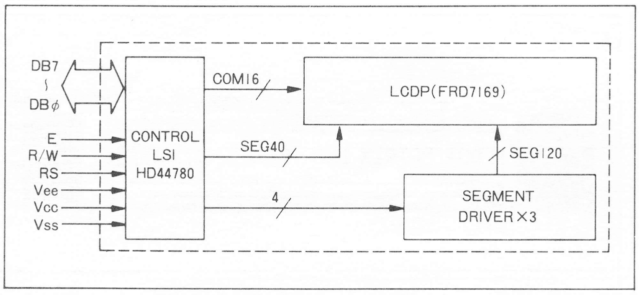
Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	V_{CC}~V_{SS}	—	0	—	7	V
Power Supply Voltage for LCD Drive	V_{CC}~V_{EE}	—	0	—	13.5	V
Input Voltage	V_I	—	V_{SS}	—	V_{CC}	V
Operating Temperature	Ta	—	0	—	+50	℃
Storage Temperature	Tstg	—	−20	—	+70	℃

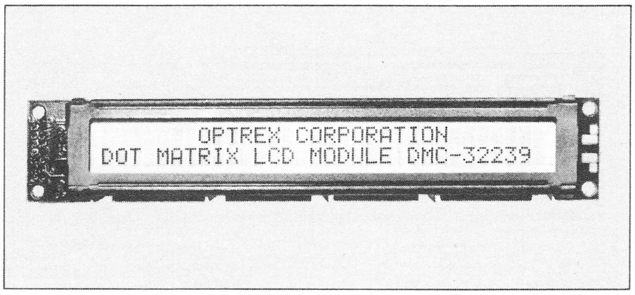
ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	—	2.2	—	V_{CC}	V
Input "Low" Voltage	V_{IL}	—	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}$=0.205mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	I_{OH}=1.2mA	—	—	0.4	V
Power Supply Current	I_{CC}	V_{CC}=5.0V	—	2.0	4.0	mA

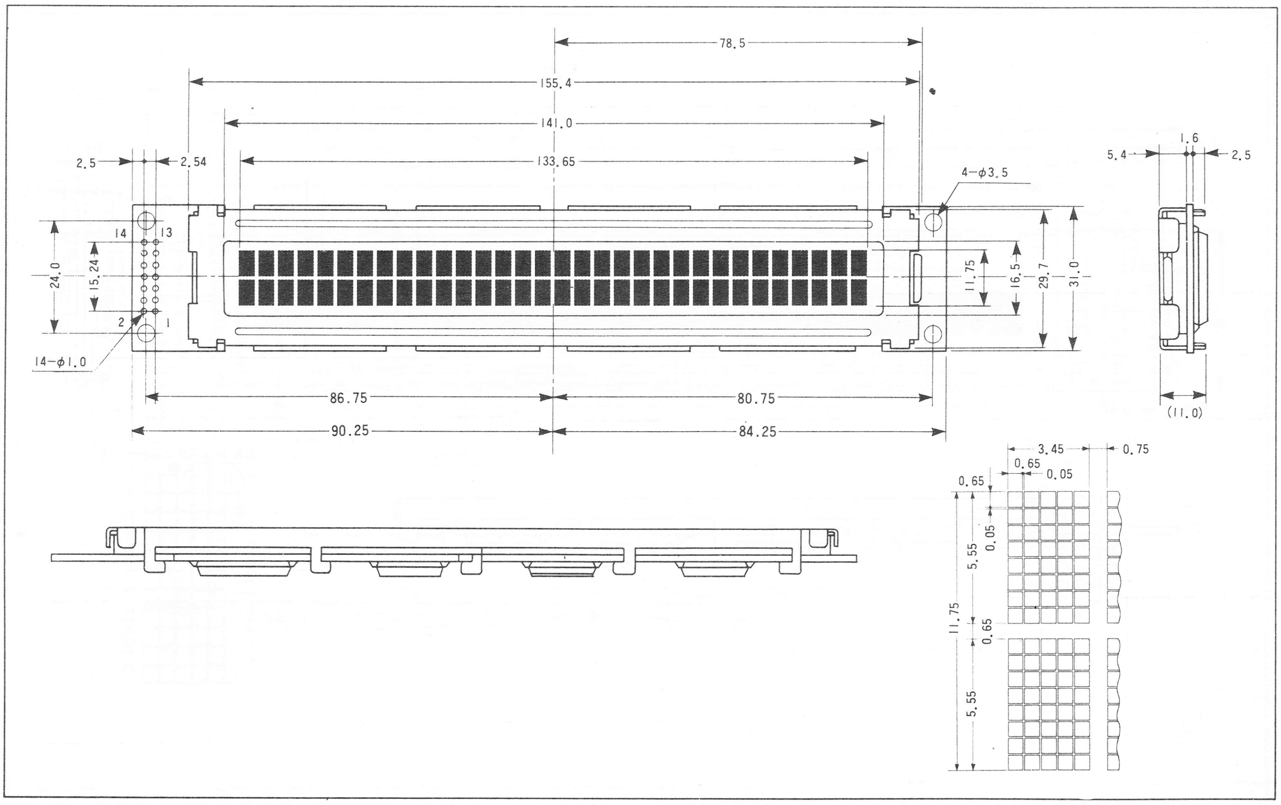
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC32216

- Display Format(32character ×2line) • Display Fonts(5×8dots) • Driving Method(1/16D)

ABSOLUTE MAXIMUM RATINGS

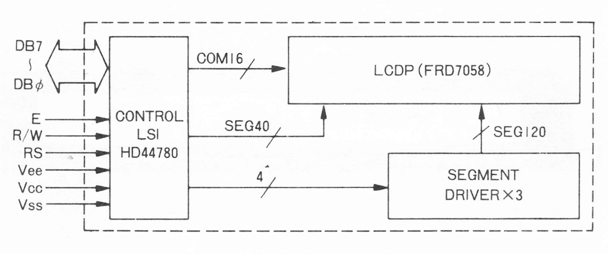
Item	Symbol	Test Condition	Standard Value min.	Standard Value typ.	Standard Value max.	Unit
Power Supply Voltage for Logic	Vcc~Vss	—	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc~Vee	—	0	—	13.5	V
Input Voltage	V_I	—	Vss	—	Vcc	V
Operating Temperature	Ta	—	0	—	+50	℃
Storage Temperature	Tstg	—	−20	—	+70	℃

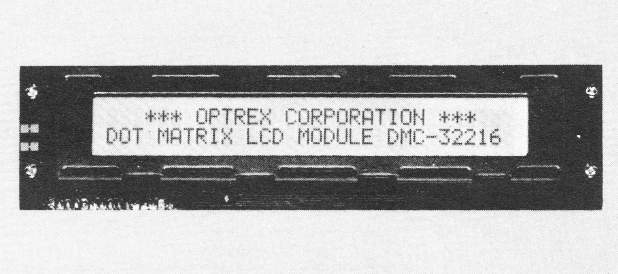
ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value min.	Standard Value typ.	Standard Value max.	Unit
Input "High" Voltage	V_{IH}	—	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	—	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}$=0.205mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	I_{OH}=1.2mA	—	—	0.4	V
Power Supply Current	Icc	Vcc=5.0V	—	2.0	4.0	mA

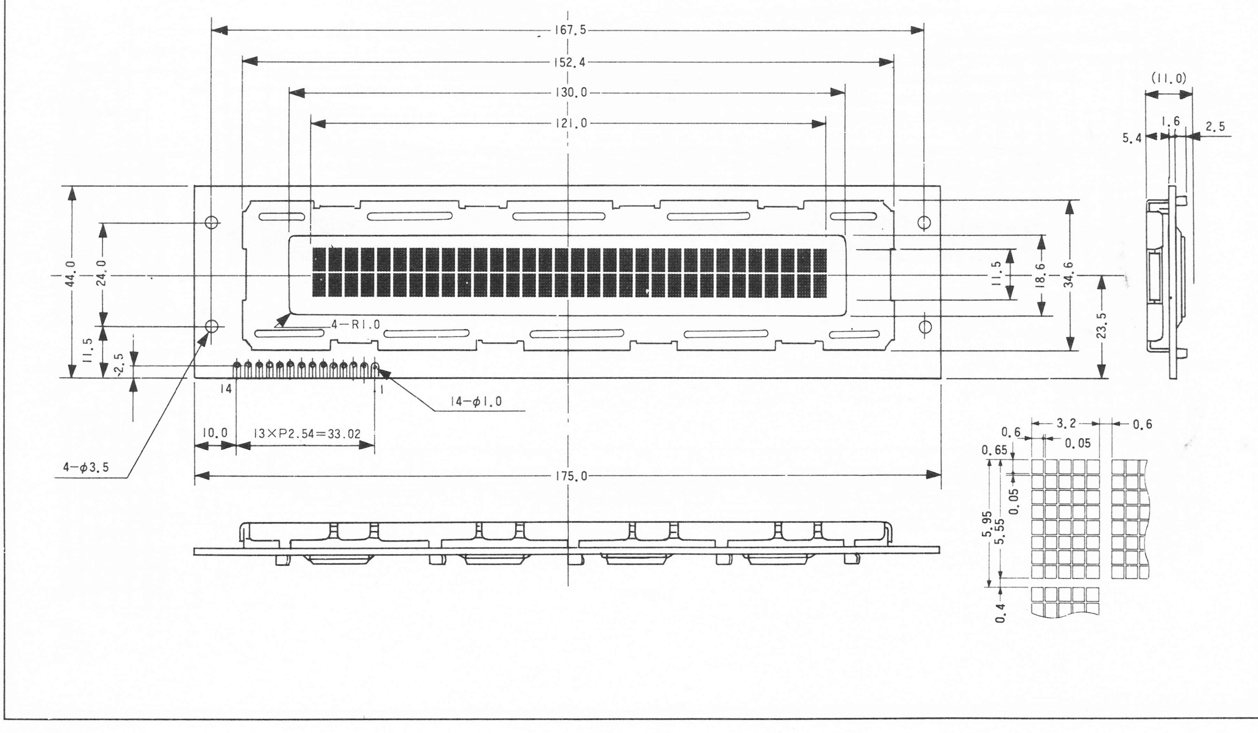
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC40131

- Display Format(40character ×1line) • Display Fonts(5×11dots) • Driving Method(1/11D)

ABSOLUTE MAXIMUM RATINGS

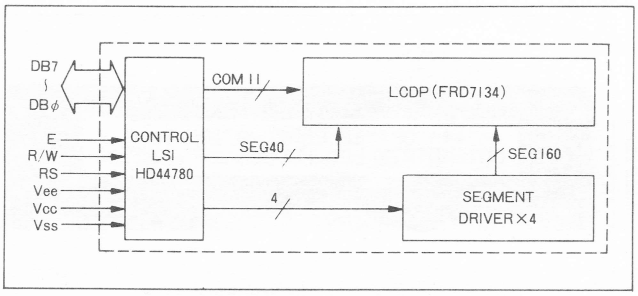
Item	Symbol	Test Condition	Standard Value min.	typ.	max.	Unit
Power Supply Voltage for Logic	Vcc~Vss	—	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc~Vee	—	0	—	13.5	V
Input Voltage	V_I	—	Vss	—	Vcc	V
Operating Temperature	Ta	—	0	—	+50	℃
Storage Temperature	Tstg	—	−20	—	+70	℃

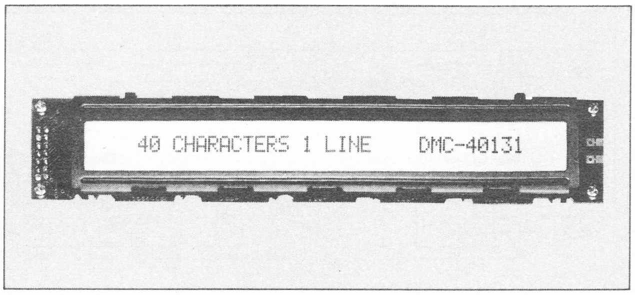
ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value min.	typ.	max.	Unit
Input "High" Voltage	V_{IH}	—	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	—	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205$mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	$I_{OH}=1.2$mA	—	—	0.4	V
Power Supply Current	Icc	Vcc=5.0V	—	2.0	5.0	mA

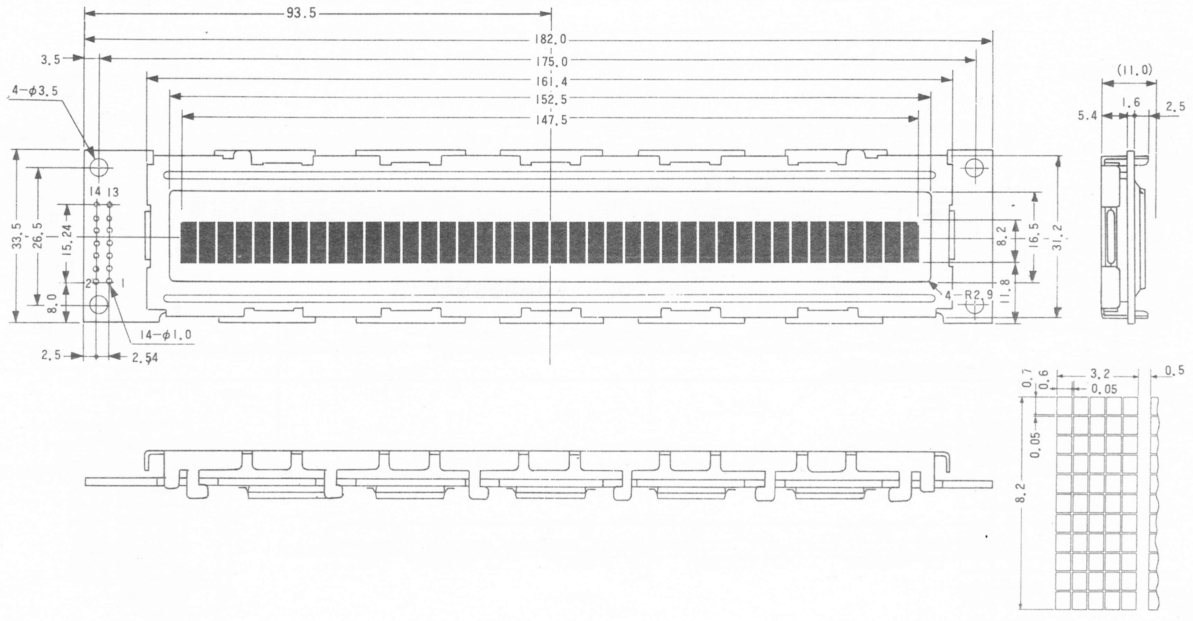
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions/Display pattern



DMC40218

- Display Format(40character ×2line) • Display Fonts(5×8dots) • Driving Method(1/16D)

ABSOLUTE MAXIMUM RATINGS

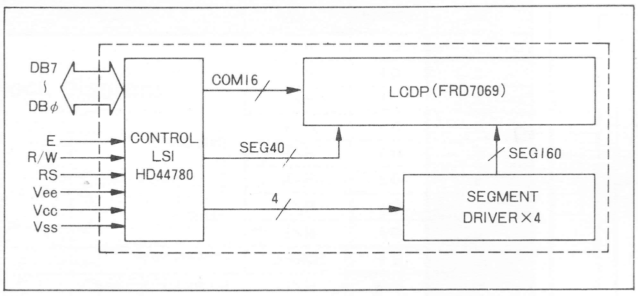
Item	Sym-bol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	Vcc~Vss	—	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc~Vee	—	0	—	13.5	V
Input Voltage	V_I	—	Vss	—	Vcc	V
Operating Temperature	Ta	—	0	—	+50	℃
Storage Temperature	Tstg	—	−20	—	+70	℃

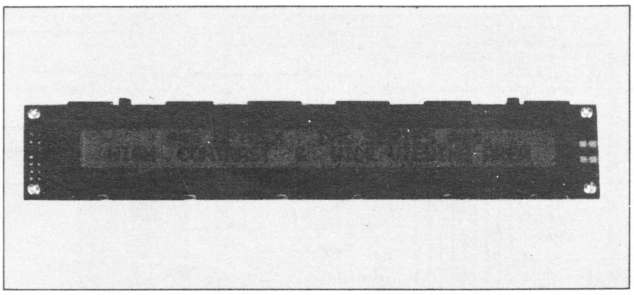
ELECTRICAL CHARACTERISTICS

Item	Sym-bol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input "High" Voltage	V_{IH}	—	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	—	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}$=0.205mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	I_{OH}=1.2mA	—	—	0.4	V
Power Supply Current	I_{CC}	Vcc=5.0V	—	2.0	5.0	mA

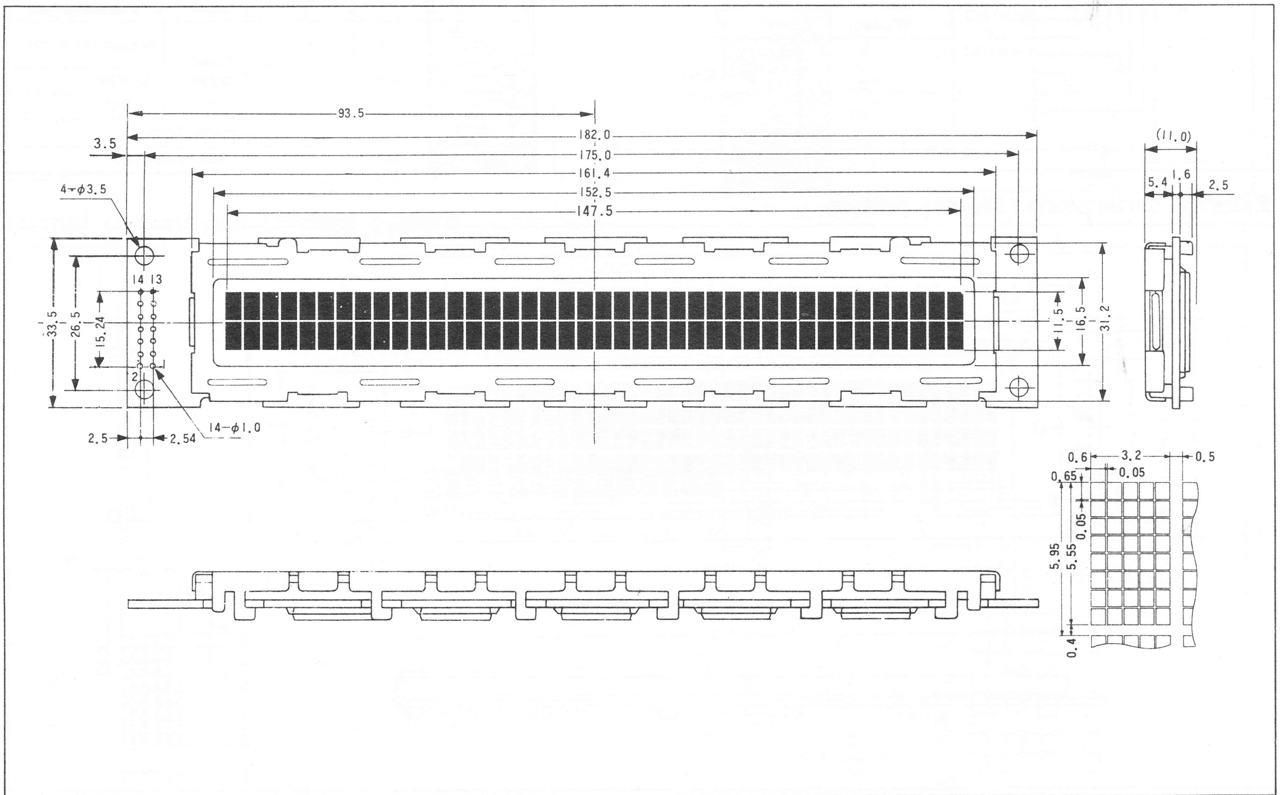
※Vcc=5.0V±5%, Ta=25°C

Block diagram





External dimensions / Display pattern



DMC40457

- Display Format(40character ×4line) ● Display Fonts(5×8dots) ● Driving Method($\frac{1}{16}$D)

ABSOLUTE MAXIMUM RATINGS

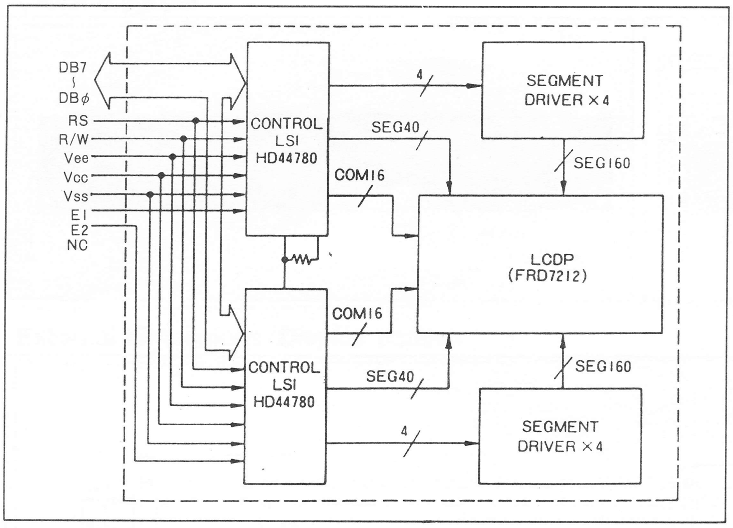
Item	Symbol	Test Condition	Standard Value min.	typ.	max.	Unit
Power Supply Voltage for Logic	Vcc~Vss	—	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc~Vee	—	0	—	13.5	V
Input Voltage	V_I	—	Vss	—	Vcc	V
Operating Temperature	Ta	—	0	—	+50	℃
Storage Temperature	Tstg	—	−20	—	+70	℃

ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value min.	typ.	max.	Unit
Input "High" Voltage	V_{IH}	—	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	—	−0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205mA$	2.4	—	—	V
Output "Low" Voltage	V_{OL}	$I_{OH}=1.2mA$	—	—	0.4	V
Power Supply Current	Icc	Vcc=5.0V	—	4.0	10.0	mA

※Vcc=5.0V±5%, Ta=25°C

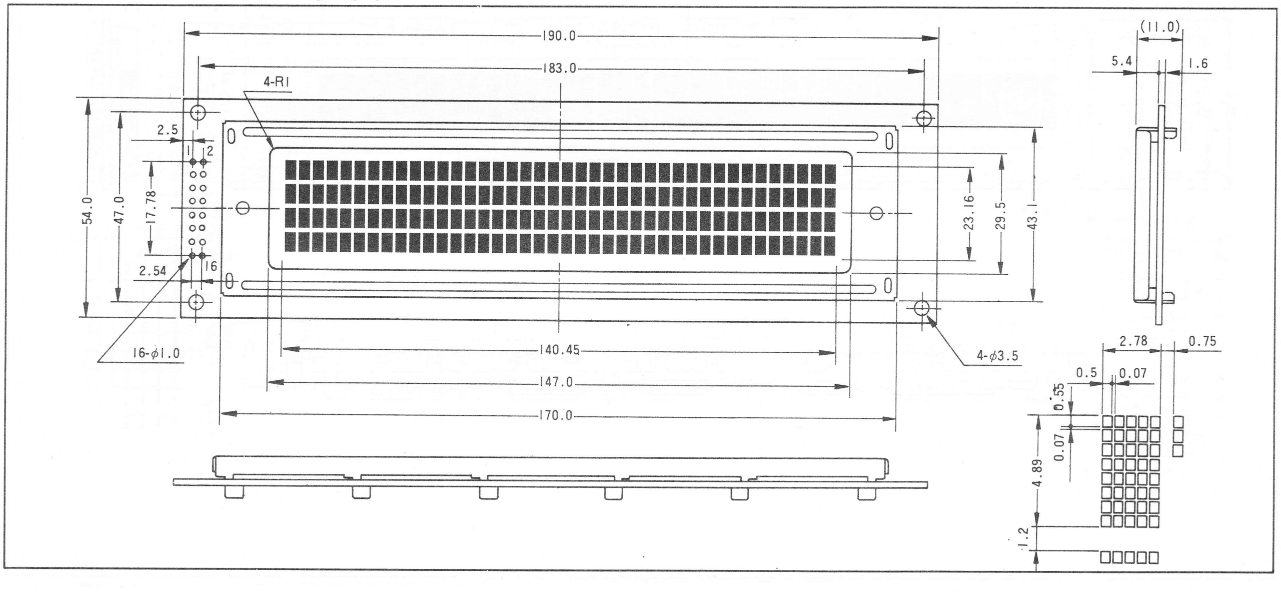
Block diagram



PIN ASSIGNMENT

NO.	Symbol	Level	Function	
1	D7	H/L	Data Bus	
2	D6	H/L		
3	D5	H/L		
4	D4	H/L		
5	D3	H/L		
6	D2	H/L		
7	D1	H/L		
8	Dϕ	H/L		
9	E1	H、H←L	Enable Signal	
10	R/W	H/L	H : READ L : WRITE	
11	RS	H/L	Register Select H : Data Input L : Instraction Input	
12	Vee	—	Power Supply	for Liquid Crystal Drive
13	Vss	—		0V(GND)
14	Vcc	—		+5V
15	E2	H、H←L	Enable Signal	
16	NC		NON CONECTION	

External dimensions / Display pattern



DMC16187-YGR (Built-in LED Back Light)

● Display Format(16character ×1line) ● Display Fonts(5×8dots) ● Driving Method(1/16D)

ABSOLUTE MAXIMUM RATINGS

Item	Sym-bol	Test Condition	Standard Value min.	typ.	max.	Unit
Power Supply Voltage for Logic	V_{CC}～V_{SS}	——	0	——	7	V
Power Supply Voltage for LCD Drive	Vcc～Vee	——	0	——	13.5	V
Input Voltage	V_I	——	Vss	——	Vcc	V
LED Forward Current	I_F	——	——	——	375	mA
LED Reverse Voltage	V_R	——	——	——	6	V
LED Power Loss	P_D	——	——	——	1800	mw
Operating Temperature	Topr	——	0	——	+50	℃
Storage Temperature	Tstg	——	-20	——	+70	℃

ELECTRICAL CHARACTERISTICS

Item	Sym-bol	Test Condition	Standard Value min.	typ.	max.	Unit
Input Voltage "High"Level	V_{IH}	——	2.2	—	Vcc	V
Input Voltage "Low"Level	V_{IL}	——	—	—	0.6	V
Output Voltage "High"Level	V_{OH}	$-I_{OH}=0.205mA$	2.4	—	—	V
Output Voltage "Low"Level	V_{OL}	$I_{OL}=1.2mA$	—	—	4.6	V
LED Forward Current	V_F	$I_F=80mA$	3.3	3.8	4.6	V
Brightness	L	$I_F=50mA$	20	35	—	cd/m²
Peak Spectrum	λp	$I_F=50mA$	—	563	—	nm
1/2 Spectrum	△λ	$I_F=50mA$	—	29	—	nm
Power Supply Current	Icc	Vcc=5.0V	—	1.0	5	mA

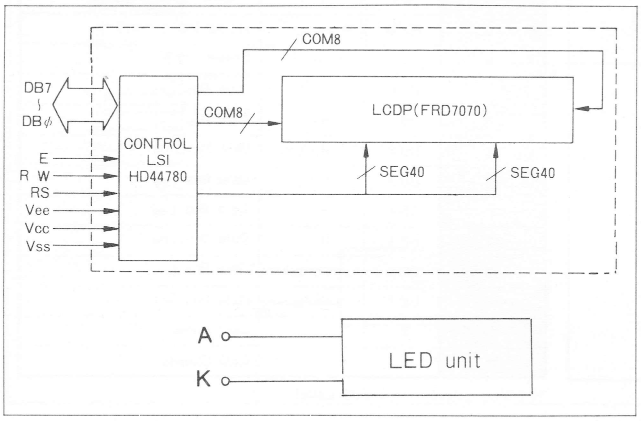
＊Vcc=5.0V±5%, Ta=25℃

PIN ASSIGNMENT

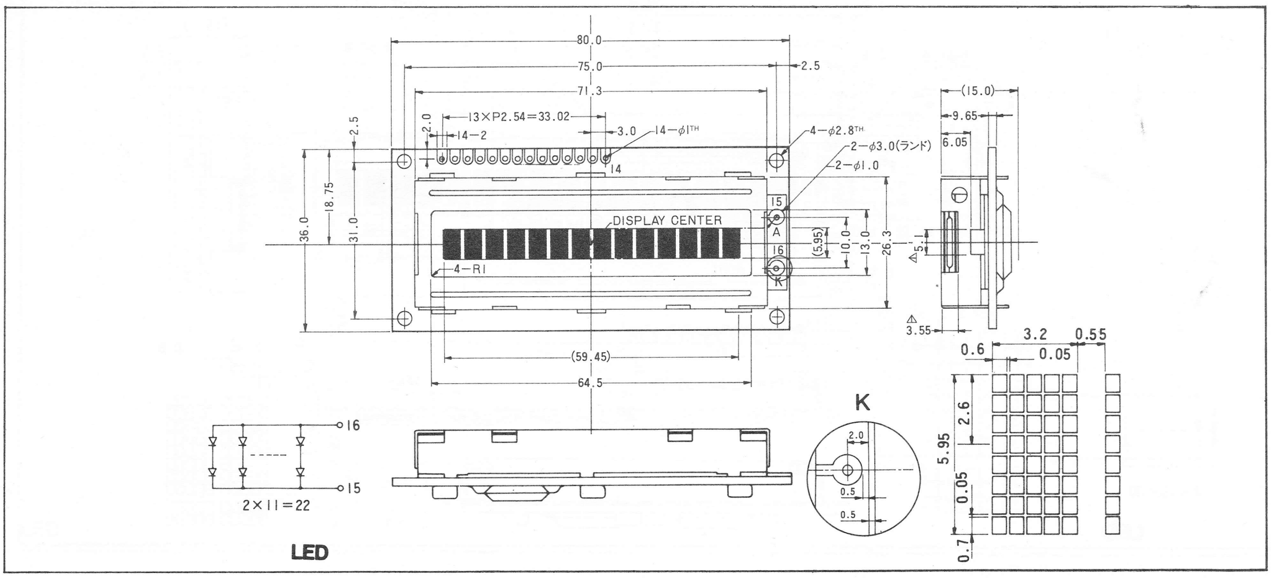
NO.	Symbol	Level	Function
1	Vss	——	Power Supply 0v(GND)
2	Vcc	——	Power Supply +5V
3	Vee	——	for Liquid Crystal Drive
4	RS	H/L	Register Selected Signal
5	R/W	H/L	H : Read、L : Write
6	E	H、H←L	Enable Signal
7	DB 0	H/L	Data Bus Line
8	DB 1	H/L	Data Bus Line
9	DB 2	H/L	Data Bus Line
10	DB 3	H/L	Data Bus Line
11	DB 4	H/L	Data Bus Line
12	DB 5	H/L	Data Bus Line
13	DB 6	H/L	Data Bus Line
14	DB 7	H/L	Data Bus Line
15	A	——	LED Anode
16	K	——	LED Cathode

H : Vcc Level　L : Vss Level

Block diagram



External dimensions/Display pattern



DMC16266-YGR (Built-in LED Back Light)

- Display Format(16character ×2line) • Display Fonts(5×8dots) • Driving Method(1/16D)

ABSOLVTE MAXIMUM RATINGS

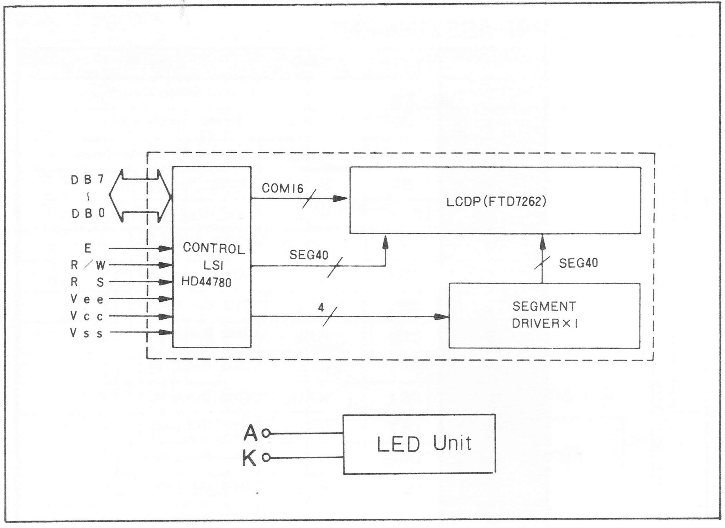
Item	Sym-bol	Test Condi tion	Standard Value			Unit
			min.	typ.	max.	
Power Supply Voltage for Logic	Vcc~Vss		0	—	7	V
Power Supply Voltage for LCD Drive	Vcc~Vee		0	—	13.5	V
Input Voltage	V_I		Vss	—	Vcc	V
LED Forward Current	I_F		—	—	375	mA
LED Reverse Voltage	V_R		—	—	6	V
LED Power Loss	P_D		—	—	1800	mw
Operating Temperature	Topr		0	—	+50	℃
Storage Temperature	Tstg		-20	—	+70	℃

ELECTRICAL CHARACTERISTICS

Item	Sym-bol	Test Condition	Standard Value			Unit
			min.	typ.	max.	
Input Voltage "High"Level	V_{IH}	———	2.2	—	Vcc	V
Input Voltage "Low"Level	V_{IL}	———	-0.3	—	0.6	V
Output Voltage "High"Level	V_{OH}	$-I_{OH}=0.205mA$	2.4	—	—	V
Output Voltage "Low"Level	V_{OL}	$I_{OL}=1.2mA$	—	—	0.4	V
LED Forward Current	V_F	$I_F=80mA$	3.3	3.8	4.6	V
Bright ness	L	$I_F=50mA$	20	35	—	cd/m²
Peak Spectrum	λp	$I_F=50mA$	—	563	—	nm
1/2 Spectrum	△λ	$I_F=50mA$	—	29	—	nm
Power Supply Current	Icc	Vcc=5.0V	—	0.5	2.0	mA

＊Vcc=5.0V±5%, Ta=25℃

Block diagram

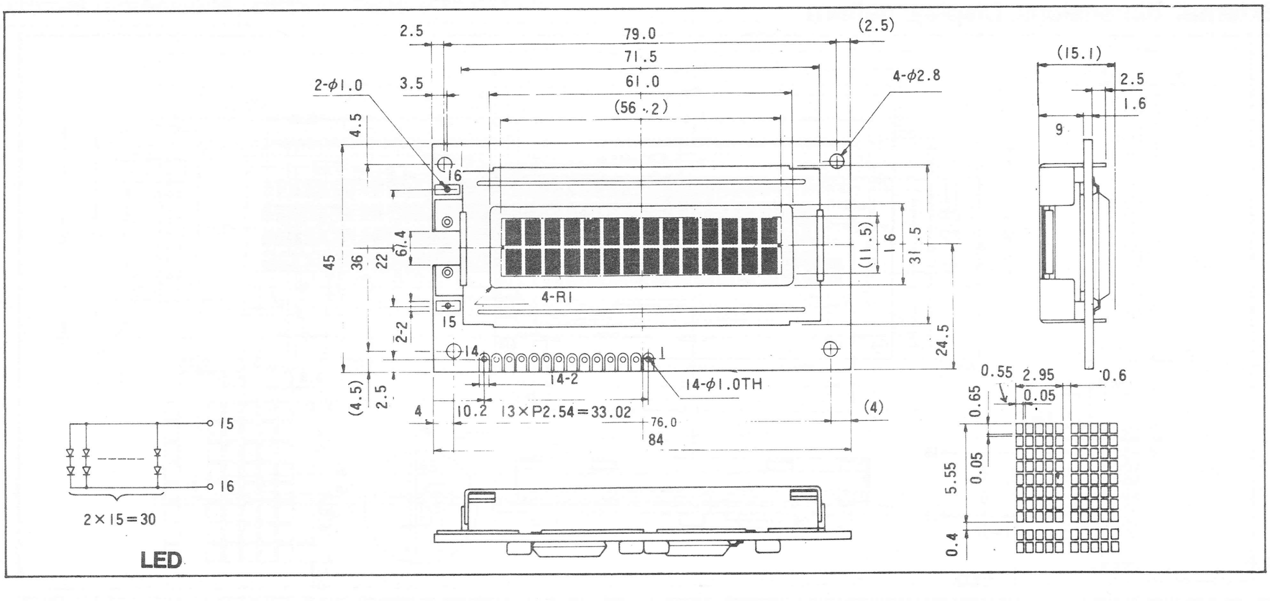


PIN ASSIGNMENT

NO.	Symbol	Level	Function
1	Vss	———	Power Supply Ov(GND)
2	Vcc	———	Power Supply +5V
3	Vee	———	for Liguid Crystcl Drive
4	RS	H/L	Register Selected Signal
5	R/W	H/L	H : READ、L : WRITE
6	E	H、H←L	Enable Signal
7	DB0	H/L	Data Bus Line
8	DB1	H/L	Data Bus Line
9	DB2	H/L	Data Bus Line
10	DB3	H/L	Data Bus Line
11	DB4	H/L	Data Bus Line
12	DB5	H/L	Data Bus Line
13	DB6	H/L	Data Bus Line
14	DB7	H/L	Data Bus Line
15	A	———	LED Anode
16	K	———	LED Catlode

H : Vcc Level L : Vss Level

External dimensions / Display pattern



DMC40267-YGR (Built-in LED Back Light)

- Display Format(40character ×2line) • Display Fonts(5×8dots) • Driving Method(1/16D)

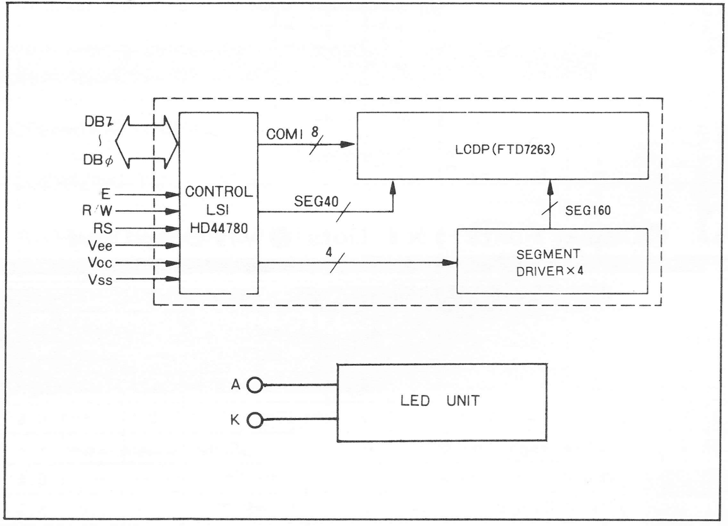
ABSOLVTE MAXIMUM RATINGS

Item	Symbol	Test Condition	Standard Value min.	typ.	max.	Unit
Power Supply Voltage for Logic	Vcc~Vss	—	0	—	7	V
Power Supply Voltage for LCD Drive	Vcc~Vee	—	0	—	13.5	V
Input Voltage	V_I	—	Vss	—	Vcc	V
LED Forward Current	I_F	—	—	—	975	mA
LED Reverse Voltage	V_R	—	—	—	6	V
LED Power Loss	P_D	—	—	—	4320	mw
Operating Temperature	Topr	—	0	—	+50	℃
Storage Temperature	Tstg	—	-20	—	+70	℃

ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value min.	typ.	max.	Unit
Input "High" Voltage	V_{IH}	—	2.2	—	Vcc	V
Input "Low" Voltage	V_{IL}	—	-0.3	—	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}$=0.205mA	2.4	—	—	V
Output "Low" Voltage	V_{OL}	I_{OL}=1.2mA	—	—	0.4	V
LED Forward Current	V_F	I_F=180m A	3.2	3.7	4.5	V
Power Supply Current	I_{CC}	Vcc=5.0V	—	2.0	5	mA

Block diagram

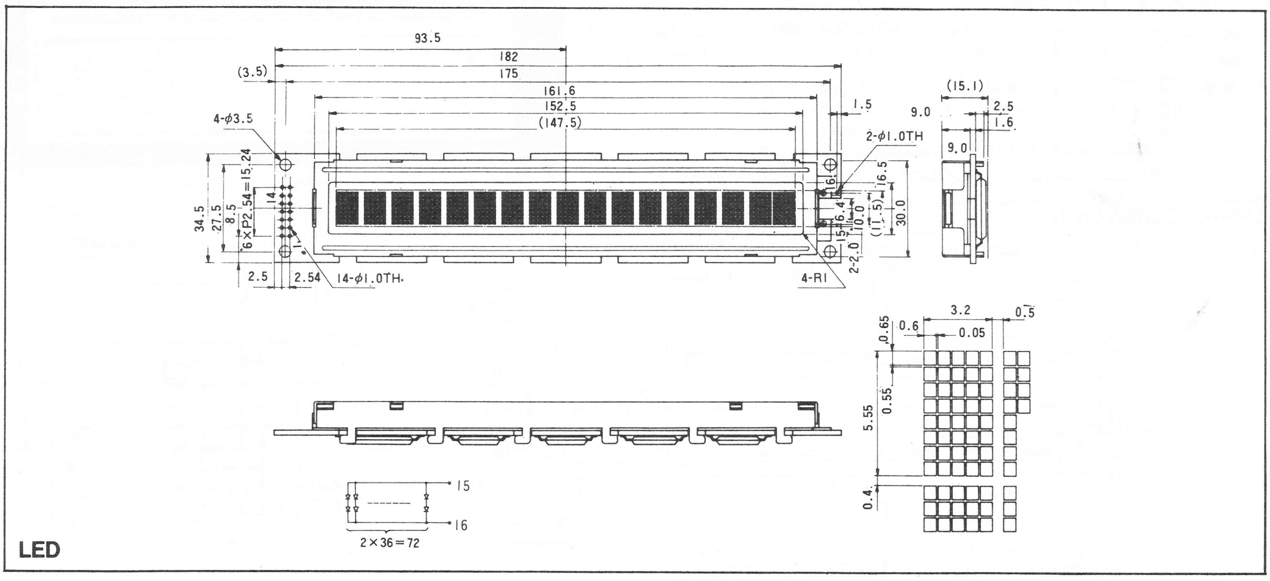


PIN ASSIGNMENT

NO.	Symbol	Level	Function
1	Vss	—	Power Supply 0v(GND)
2	Vcc	—	Power Supply +5V
3	Vee	—	for Liquid Crystol Drive
4	RS	H/L	Register Selected Signal
5	R/W	H/L	H : Read, L . Write
6	E	H, H←L	Enable Signal
7	DB 0	H/L	Data Bus Line
8	DB 1	H/L	Data Bus Line
9	DB 2	H/L	Data Bus Line
10	DB 3	H/L	Data Bus Line
11	DB 4	H/L	Data Bus Line
12	DB 5	H/L	Data Bus Line
13	DB 6	H/L	Data Bus Line
14	DB 7	H/L	Data Bus Line
15	.A	—	LED Anode
16	K	—	LED Catlode

H : Vcc Level　L : Vss Level

External dimensions / Display pattern



DMC20481 (20 characters × 4 lines) ●Display Fonts 5 × 8 Dots ●1/16 Duty Drive

■ABSOLUTE MAXIMUM RATINGS

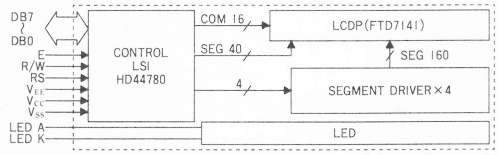
Item	Symbol	Test Condition	Standard Value min.	Standard Value max.	Unit
Supply Voltage for Logic	$V_{CC}-V_{SS}$	——	−0.3	7	V
Supply Voltage for LCD Drive	$V_{CC}-V_{EE}$	——	$V_{CC}-13.5$	$V_{CC}+0.3$	V
Input Voltage	V_I	——	−0.3	$V_{CC}+0.3$	V
LED Forward Current	I_F	——	——	480	mA
LED Reverse Voltage	V_R	——	——	8	V
LED Power Loss	P_D	——	——	2.0	W
Operating Temperature	Topr	——	0	+50	℃
Storage Temperature	Tstg	——	−20	+70	℃

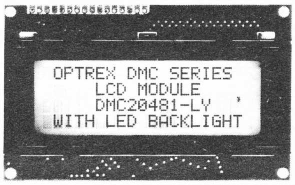
■ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value min.	Standard Value typ.	Standard Value max.	Unit
Input "High" Voltage	V_{IH}	——	2.2	——	V_{CC}	V
Input "Low" Voltage	V_{IL}	——	0	——	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205$mA	2.4	——	V_{CC}	V
Output "Low" Voltage	V_{OL}	$I_{OL}=1.2$mA	0	——	0.4	V
LED Forward Voltage	V_F	$I_F=240$mA	3.8	4.0	4.2	V
Brightness *1	L	$I_F=240$mA	60	——	——	cd/m²
Supply Current	I_{CC}	$V_{CC}=5.0$V	——	1.5	5.0	mA

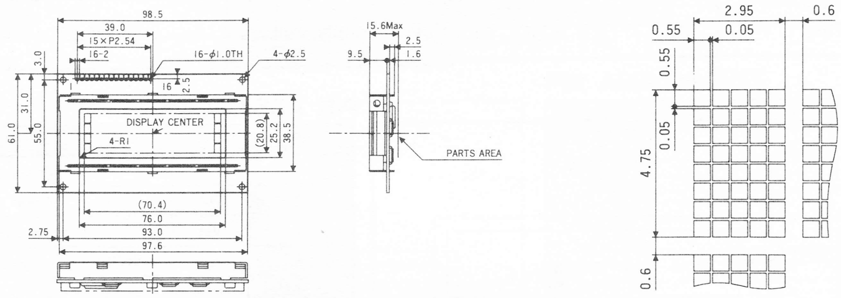
※$V_{CC}=5.0V\pm5\%$, Ta=25℃ *NOTE 1) Measured at the bare LED backlight unit.

■BLOCK DIAGRAM





■EXTERNAL DIMENSIONS



DMC24227 (24 characters × 2 lines) ●Display Fonts 5 × 8 Dots ●1/16 Duty Drive

■ABSOLUTE MAXIMUM RATINGS

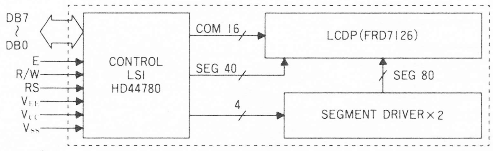
Item	Symbol	Test Condition	Standard Value min.	Standard Value max.	Unit
Supply Voltage for Logic	$V_{CC}-V_{SS}$	——	−0.3	7	V
Supply Voltage for LCD Drive	$V_{CC}-V_{EE}$	——	$V_{CC}-13.5$	$V_{CC}+0.3$	V
Input Voltage	V_I	——	−0.3	$V_{CC}+0.3$	V
Operating Temperature	Topr	——	0	+50	℃
Storage Temperature	Tstg	——	−20	+70	℃

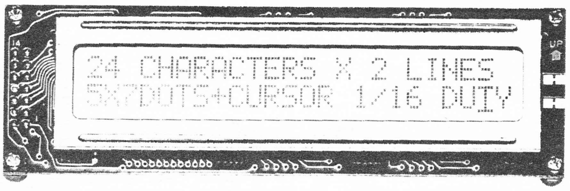
■ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value min.	Standard Value typ.	Standard Value max.	Unit
Input "High" Voltage	V_{IH}	——	2.2	——	V_{CC}	V
Input "Low" Voltage	V_{IL}	——	0	——	0.6	V
Output "High" Voltage	V_{OH}	$-I_{OH}=0.205$mA	2.4	——	——	V
Output "Low" Voltage	V_{OL}	$I_{OL}=1.2$mA	——	——	0.4	V
Supply Current	I_{CC}	$V_{CC}=5.0$V	——	2.0	5.0	mA

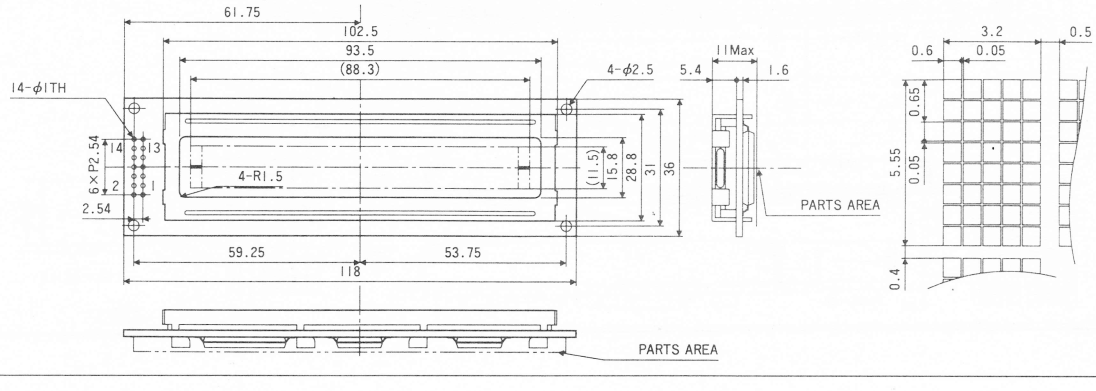
※$V_{CC}=5.0V\pm5\%$, Ta=25℃

■BLOCK DIAGRAM





■EXTERNAL DIMENSIONS



ELECTRO LUMINESCENCE FOR BACK LIGHT

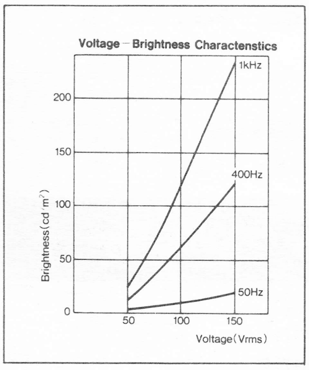
FEATURES

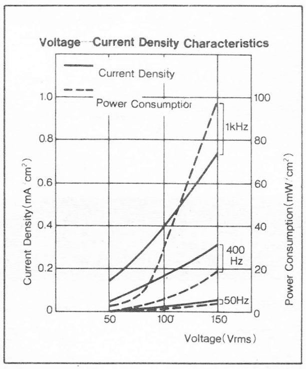
- ●Flexible flat surface light source using organic film as substrate and packaging material.
- ●Thickness is 1.3mm Max. (1.5mm Max. at the electrode portion). Suitable for high density mounting.
- ●Emitted color is "blue-green".
- ●Wide range of drive voltage such as 60~1,000Hz, AC 150V Max. is available. And, with an inverter, step-up voltage from 1.5V battery can be easily done.

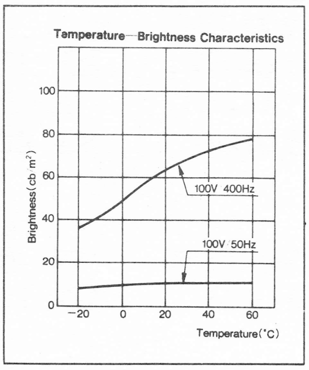
MAXIMUM RATINGS

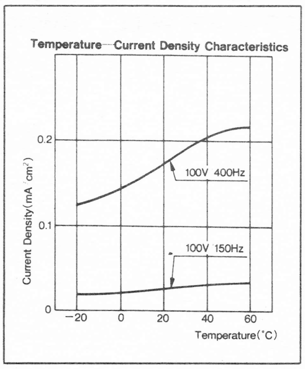
OPERATING VOLTAGE	AC150 Vrms
OPERATING TEMP. RANGE	−20~+50℃
STORAGE TEMP. RANGE	−30~+60℃

ELECTRICAL CHARACTERISTICS
(Emitted Color:blue-green)

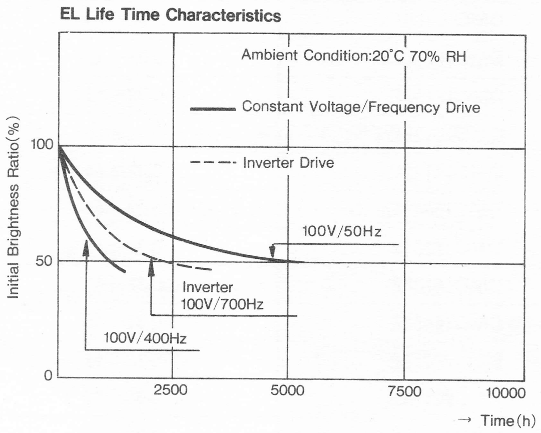


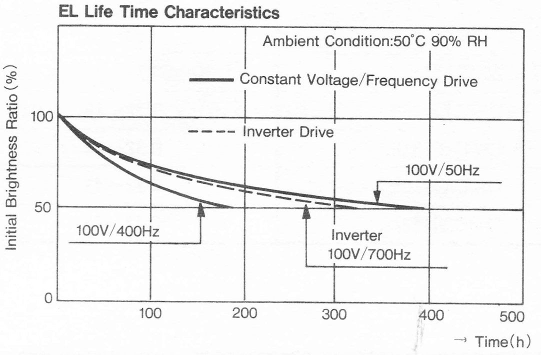






LIFE TIME





INVERTER FOR EL

Inverter is required, when DC current such as battery or dry cell is used for power supply.
Inverters have the following characteristics;

- ●Designed to best suit for organic EL, conversion loss is very small and high efficiency lighting is possible.
- ●Equipped with constant current characteristics, the inverter can control change of lighting current due to temperature variation and long time lighting and minimize brightness change.

The above diagrams show life time characteristics of EL driven by inverter.

INVERTER FOR DMC WITH EL

Model No.	Inverter
DMC16106AE	D 32−45
DMC16106CE	D 32−45
DMC16117E	D 32−45
DMC16128E	D 32−45
DMC16129E	D 32−45
DMC16249E	D 32−45
DMC16207E	D 32−45
DMC16230E	D 32−43
DMC16433E	D 32−46
DMC20215E	D 32−46
DMC20434E	D 32−46
DMC24138E	D 32−46
DMC24227E	D 32−46
DMC32132E	D 32−43
DMC32216E	D 32−43
DMC40131E	D 32−43
DMC40218E	D 32−43
DMC40457E	D 32−48

ADDITIONAL CODINGS FOR DMC MODULES

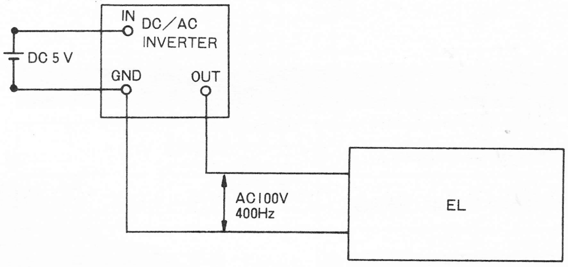
CODE		Additional Specification
1	H	Extended Temparature (Operating Temparature of −20℃ ~ +70℃)
2	U	The viewing angle from the "up" side or 12 o'clock side.
3	E	EL illumination (Standard Type only)

EXTENDED TEMPERATURE MODELS "H" TYPE

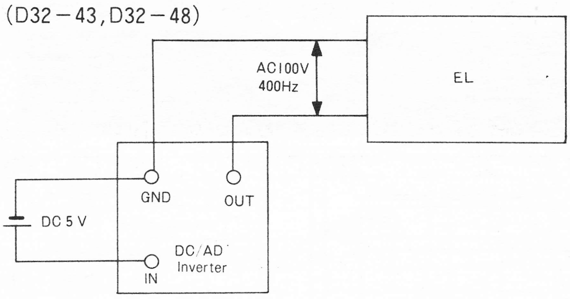
❶Operating Temperature Range : −20℃ ~ +70℃
❷Storage Temperature Range : −30℃ ~ +80℃
❸EL is standard type (ref. P34)

POWER SUPPLY FOR EL
(ELECTRO LUMINESCENCE)

(D32−45, D32−46) **Bottom View**



(D32−43, D32−48)



EXAMPLES OF NEW CODINGS

Basic model : DMC16207
Extended : DMC16207H
12 O'CLOCK : DMC16207U
12 O'CLOCK W/EL : DMC16207UE

DOT MATRIX LCD MODULES

★ ★ ★ *Example of Initialization* ★ ★ ★

1. Power up the module.
2. Adjust the contrast of the display so some of the squares are lit up. **NOTE:** Only the left half or first row will light up depending on which display you have.
3. Set "RS" and "R/W" to a logic 0.
4. Send the following codes to the data lines:

    38 HEX
    Enable Pulse (4ms or more)
    38 HEX
    Enable Pulse (4ms or more)
    38 HEX
    Enable Pulse (4ms or more)
    0F HEX
    Enable Pulse (500 NS or more)
    01 HEX
    Enable Pulse (500 NS or more)
    06 HEX
    Enable Pulse (500 NS or more)

After these six codes have been sent to the display, the cursor should be blinking in the upper left corner or the home position.

To send characters to the display, set "RS" to a Logic 1, then send out ASCII codes to the data lines.

To access the right half of the 16 x 1 display set "RS" to Logic Level 0. Then send out "C0" on the data lines. Pulse the enable line, then return the "RS" line to a Logic Level 1 for character display. Addressing for the rest of the modules is given below:

(16 x 1)
80 : 81 : 82 : 83 : 84 : 85 : 86 : 87 : C0 : C1 : C2 : C3 : C4 : C5 : C6 : C7

(16 x 2)
80 : 81 : 82 : 83 : 84 : 85 : 86 : 87 : 88 : 89 : 8A : 8B : 8C : 8D : 8E : 8F
C0 : C1 : C2 : C3 : C4 : C5 : C6 : C7 : C8 : C9 : CA : CB : CC : CD : CE : CF

(20 x 1)
80 : 81 : 82 : . . . THRU 93

(20 x 2)
80 : 81 : 82 : . . . THRU 93
C0 : C1 : C2 : . . . THRU D3

(20 x 4)
80 : 81 : 82 : . . . THRU 93
C0 : C1 : C2 : . . . THRU D3
94 : 95 : 96 : . . . THRU A7
D4 : D5 : D6 : . . . THRU E7

(40 x 2)
80 : 81 : 82 : . . . THRU A7
C0 : C1 : C2 : . . . THRU E7